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RCEME

TECHNICAL BULLETIN

VOLUME 12, NUMBER 2 APRIL 1967

CANADIAN ARMED FORCES

TATTOO

LE CARROUSEL MILITAIRE DES FORCES CANADIENNES

RCEME TECHNICAL BULLETIN

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Cover: Four members of the TATTOO quick - assembly jeep team each with his appointed task: Laverdiere, steering wheel; McSween, hood; Ryan radiator, Pfeifer, battery - Cpl Baird photo

This Technical Bulletin is issued under the authority of Lt Col GW Bruce, CD, SO Weapon Systems Management Land, Materiel Command Headquarters, who has approved the contents for publication.

The Bulletin is published to assist RCEME personnel in keeping abreast of current trends in developments, to amplify or emphasize technical instructions, to circulate news of Corps and individual activities, and to provide a forum for discussion and the exchange of ideas by members of the Corps. The information and statements herein do not necessarily represent official policy and are not to be quoted as authority for action.

EDITORS

DC Paterson — Editor
Maj HA Rosson, CD — Technical Exchange Column

So You Don't Like The New Equipment !

We hear lots of gripes about the unreliability of new equipment but those of us who handle Equipment and Technical Failure Reports in Ottawa know that many premature or unusual failures are not reported. In some cases epidemic failure of a new equipment has only been revealed after an investigation triggered by offhand verbal complaints by RCEME personnel.

But every RCEME officer and technician knows that factual information on technical failures must be reported to a central agency. The importance of failure reporting is clearly explained in the two EME Manual instructions which detail failure reporting: Management H 601 "Defect and Failure Report Procedures" and General H 100 "Technical Equipment Fault Reporting."

If the importance of failure reporting is so well understood, why do some people fail to formally report significant defects? A study of the problem reveals two reasons why important failures are not reported. Frequently the equipment defect is thought to be an isolated one because the equipment itself is not on wide local distribution. In other cases, the technician or officer thinks that a failure report has already been submitted by some one else; for example, at depot level it is thought that a report has been submitted by the user.

You won't believe this, but two years ago no failures had been formally reported on the Navaid Sperry Inverter even though half of all the inverters then in the field were unserviceable. Again, more recently, only two formal reports had been received on a new instrument - the Frequency Measuring Set AN/URM 504 - but it is now obvious that many more unreported failures have occurred. Because all failures were not reported, units will have to wait a long time before the instruments can be modified by the manufacturer to make them serviceable. The examples described are typical and show the importance of early defect reporting.

In most maintenance units, the final decision as to whether a failure should reported is more often than not a matter for the judgement of the individual technician or officer. In these doubtful cases, remember that it is much better to err in submitting too many, rather than too few, failure reports.

Prompt and frequent defect reporting will help you put unserviceable equipment back on the road.

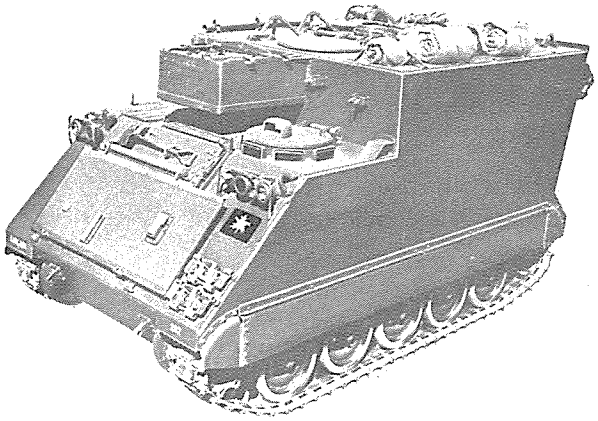
Some New Equipment

ARMOURED COMMAND POST M577A1

This vehicle, on a M113A1 chassis, carries a driver and four-man operating team, in a working area of 48 sq feet, with provision for an additional 100 sq feet of covered extension. The inside height is just over 6 feet, and suitable desk and shelf space is provided.

A gasoline-engine-driven generator set provides 150 amps of 24-30 volts of dc current to power the AN/VRC-49 radio and IC equipment.

The vehicle has a top land speed of 40 mph with a range of 300 miles. Water speed is 3.6 mph. It is air transportable.



COMMAND AND RECONNAISSANCE VEHICLE (LYNX)

Although smaller and more maneuverable than the M113A1 and M577A1, many of the components will be interchangeable. After seeing a prototype which came off the assembly line at FMC in 1963, Canadian design authorities wanted some changes made to provide for better all-round defence. The model shown embodies these changes.

It carries a crew of three -- driver, commander/gunner, and radio operator/observer.

With a crusing range of 325 miles it has a speed of 40 mph and will climb a 60 per cent slope, mount a 2-foot wall and cross a 5-foot trench. Delivery of the first vehicles is expected late in 1967.

155 MM SELF-PROPELLED HOWITZER, M109

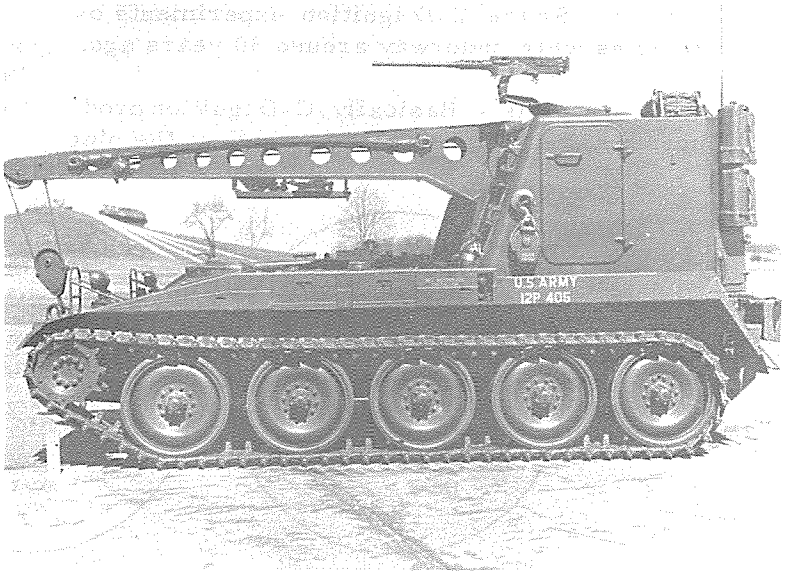
The self-propelled M109 mounts a 155 mm howitzer that can traverse 360 degrees, elevate 75 degrees and depress 3 degrees by means of manual or electro-hydraulic system. An equilibrator system is incorporated to balance the weapon; sighting and fire control instruments are installed for laying the weapon in elevation or azimuth or positioning the howitzer on a visible target. The weapon employs a hydro-pneumatic recoil system and a semi-automatic screw-block type breech mechanism which should add interesting employment to our Weapons Technicians.

RECOVERY VEHICLE M 578

This vehicle, which may be introduced in 1968, is a full-tracked light armoured recovery vehicle. A number of them are being procured especially for servicing/recovering the 155/mm Howitzer M109.

The vehicle is 21 feet long, 10 feet wide and weighs some 25 tons. The main winch has a capacity of 30 tons; the boom winch, 15 tons. It is manned by a crew of three - the driver, an operator and a rigger, and carries a 50 cal MG for defence.

It is powered by an 8-cylinder GMC diesel and has a top speed of 34 mph, or 20 mph on the level with a load.



CAPACITOR-DISCHARGE
a new breed of lightning for engine ignition

By Jack Lyndall, Assoc Ed Fleet Owner

Long awaited, and hailed as the nearly maintenance-free ignition system, capacitor discharge ignition is now available as a regular production option on some cars and trucks. After-market units can be easily installed on existing vehicles. Regardless of the type, capacitor discharge ignition has several long-desired abilities: C-D ignition can fire badly fouled or gas-wet spark plugs; it vastly improves cold weather starting; it maintains top ignition performance at high engine speeds - even up to 8000 rpm; in most of its designs, ignition points are eliminated with their attendant maintenance problems.

Spark plug life up to 50,000 miles is reported by test users of C-D ignition, together with improved fuel mileage. Frequent ignition tune-ups are no longer needed - but the spark plugs and wiring harness do still require intelligent, though infrequent, attention.

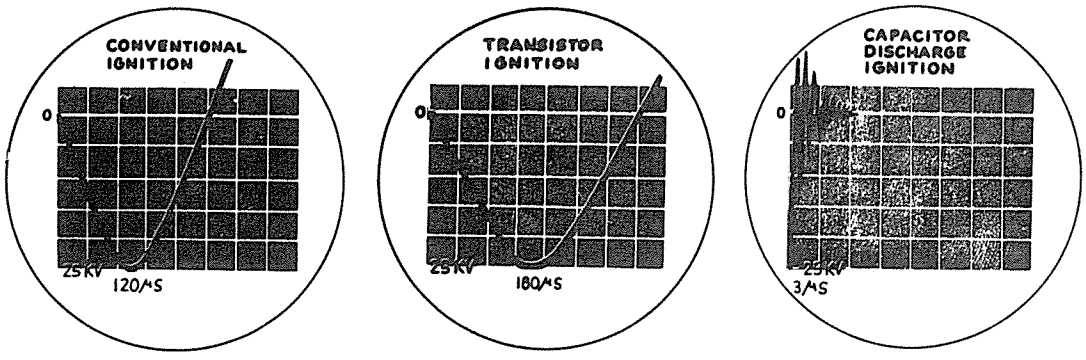
Actually, capacitor discharge ignition systems are not new. They came into existence even before the advent of transistorized ignition. Some C-D ignition experiments on vehicles were underway around 30 years ago.

What it is - Basically, C-D ignition produces a hotter, higher energy spark at the plug in less time, even with a weak battery, and with precisely controlled timing. The primary difference between capacitor discharge and other ignition systems is the method of storing and releasing the electrical energy needed to fire the spark plugs. Other systems, conventional and transistorized, are inductive, depending on the energy induced in the ignition coil to do the job.

In the C-D system, a power converter and a capacitor (condenser) have been added to store the electrical energy and release it when needed. Using the capacitor to store or 'hold' an electrical charge until needed, an impulse can be transformed to 30,000 volts or more and released so quickly that it can fire fouled, burned, or wet spark plugs. These would cause 'missing' in a conventional system.

Three major properties of an ignition system determine its overall performance capability: output voltage; available energy; output voltage rise time. In all three, the C-D system excels other types.

Output Voltage - Conventional ignition systems deliver voltage outputs at the spark plug in the order of 15,000 volts. Contrasted to the conventional 15,000 volts, C-D systems put out



Dramatic rise time of C-D system compared to older systems. Data is based on test with engine speed of 500 rpm. Graph scale: vertical - 5 KV/divisions; horizontal - 50 microseconds/divisions.

25,000 to 40,000 volts at the plug tip.

Available Energy - The C-D system can actually be built to have too much available energy and secondary voltage. While electrical engineers talk in terms of millijoules and effective capacitance, it is sufficient to say in layman's language that C-D ignition systems are designed and made to have energy capacity for firing fouled or wet spark plugs even if battery voltage goes down as low as 4.5 volts during cranking.

Output Voltage Rise Time - Herein lies one of the real factors of superiority for the C-D system. Again using layman's terms, this is the time needed for the system's output voltage to the spark plug to rise from zero to maximum voltage.

Measuring rise time, electrical engineers use the yardstick of microseconds - one microsecond is one millionth of a second. Conventional ignition systems take about 120 microseconds to reach their average maximum output of 25,000 volts (25 KV). Transistor ignition systems require a little longer - about 180 microseconds to reach 25 KV, or a little higher, output. But C-D ignition systems have rise times ranging from three microseconds to about 35 microseconds!

Ignition engineers say that corona and shunt resistive losses are directly proportional to rise time. To the fleet shop man, this means that the faster the spark, or high voltage pulse, can be delivered to the spark plug tip, the less chance for it to be weakened or diverted.

The deposits that build up on spark plugs are familiar to every mechanic. These are carbon from oil and fuel combustion, lead deposits precipitated from leaded gasoline and sometimes unburned gasoline. They can form an electrical circuit of sorts from the spark plug electrodes to the plug shell and then to ground via the engine cylinder head.

The blazing-fast rise time of the C-D system overcomes this voltage leakage problem. The charge to the spark plug is delivered so fast that there is no time for the energy to trickle away through the plug deposits. The charge jumps the spark plug electrodes, regardless of the fouling.

The C-D system is equally effective in overcoming another leakage path. It can fire spark plugs even though spark plug wiring harness and plugs themselves are wet from atmospheric condensation or road splash.

Still another advantage appears for the C-D system. It is not affected by problems connected with slow engine cranking speeds.

With conventional ignition, high voltage drops or falls off due to the relatively slow rate of breaker point movement during cranking. The regular condenser is not fully effective in preventing point arcing at cranking, leading to the long-familiar problem of 'burned' points. In fact, the difference in the type of energy storage and method of its release cause major differences in performance at cranking speeds.

Comparison tests have shown that the C-D system can supply 25,000 volts at cranking speeds approaching zero rpm; conventional and transistor systems drop to about 10,000 volts at 10 rpm. This is substantially due to the slow opening of breaker points in conventional systems at slow cranking speeds.

These figures were compiled with 12 volts input to the starter and ignition system; under cold cranking conditions and lowered battery efficiency, the voltage drop-off becomes even more critical for the conventional and transistorized systems. The slow-speed cranking performance of C-D systems would seem to offer a special benefit for large engines with gear-reduction starters. Such engines have normally slow cranking speeds.

Also, the dwell time, or period when points are closed and battery current flows to the coil, is long. The ignition system draws maximum average current at a time when battery reserves are already taxed by the starter motor. Generations of mechanics have stated the problem when contending with an engine grinding away in a futile starting attempt on a cold morning: "The starter is taking everything the battery can put out and there's nothing left for the ignition."

Dwell time, or the number of degrees of distributor cam rotation from the time points close until they open again, is of little or no

(continued on page 8)

Statistical Quality Control

By Major RDL Connell

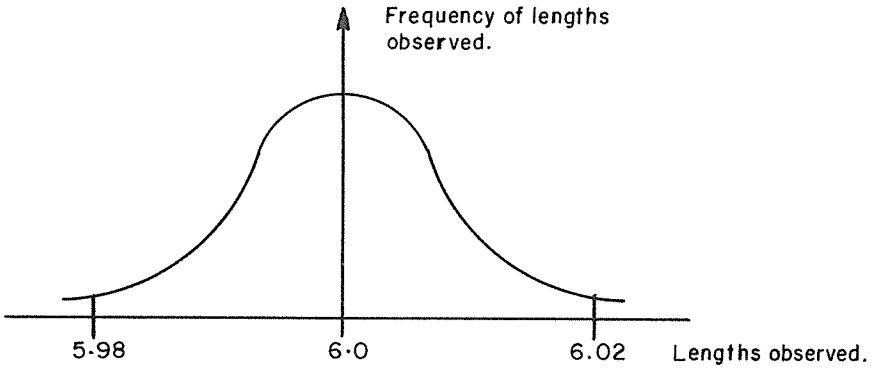
Many of us are familiar with monitoring by means of go - no go gauges in order to apply quality control to a system. However the use of go - no go gauges requires either 100% sampling or a large percentage of samples to ensure that the sample is representative of the output of the system. The Shewhart method of statistical quality control allows:

a. a much less frequent sample which accurately represents the characteristics of the output.

b. an indication of the source of faults in the system, thus simplifying corrective action.

The method is particularly applicable to production processes but is not limited to that field.

In the design of any system, perfection is impossible. Drawings show specifications of e.g. 6 ± 0.02, due to the fact that all materials, machines and measuring devices have a tolerance. The result is that as long as only chance causes exist the resulting output will follow the well known probability distribution, or bell-shaped curve centered on the desired dimension.



If a disturbance in the production system changes the shape of the bell curve or shift of the axis, then these can be labelled assignable causes. The object now is to separate the chance causes and the assignable causes by sample measurements.

Shewhart then designed this system. A control chart is used and is based on a series of a number of sets of samples. An example is presented for clarity. Five consecutive observations are taken in the set, and a gap permitted to allow assignable causes to become measurable. Another five consecutive observations are taken in the next set and the process repeated.

Sample set Number	Observation Number					Sample set mean	Sample Set range
	1	2	3	4	5	$\bar{X}$	R
1	23	17	35	18	22	23	18
2	24	37	42	37	39	36	18
3	48	42	41	33	20	37	28
4	27	41	21	45	22	31	20
						127	84

$$\text{Process average} = \bar{\bar{X}} = \frac{127}{4} = 32$$

$$\text{Average range} = \bar{R} = \frac{84}{4} = 21$$

Observations within the sample sets may be in any order but consecutive sets must be recorded in the observed sequence.

It is next necessary to determine how accurate we wish our process. The usual industrial limit is 3σ variations, a 99.7% chance that the system will stay within the standard deviation of the population under observation.

A control chart must now be plotted with the following limits for $\bar{\bar{X}}$, the process average:

$$\text{Upper Control Limit } UCL_{\bar{x}} = \bar{\bar{X}} + A_2 \bar{R}$$

$$\text{Lower Control Limit } LCL_{\bar{x}} = \bar{\bar{X}} - A_2 \bar{R}$$

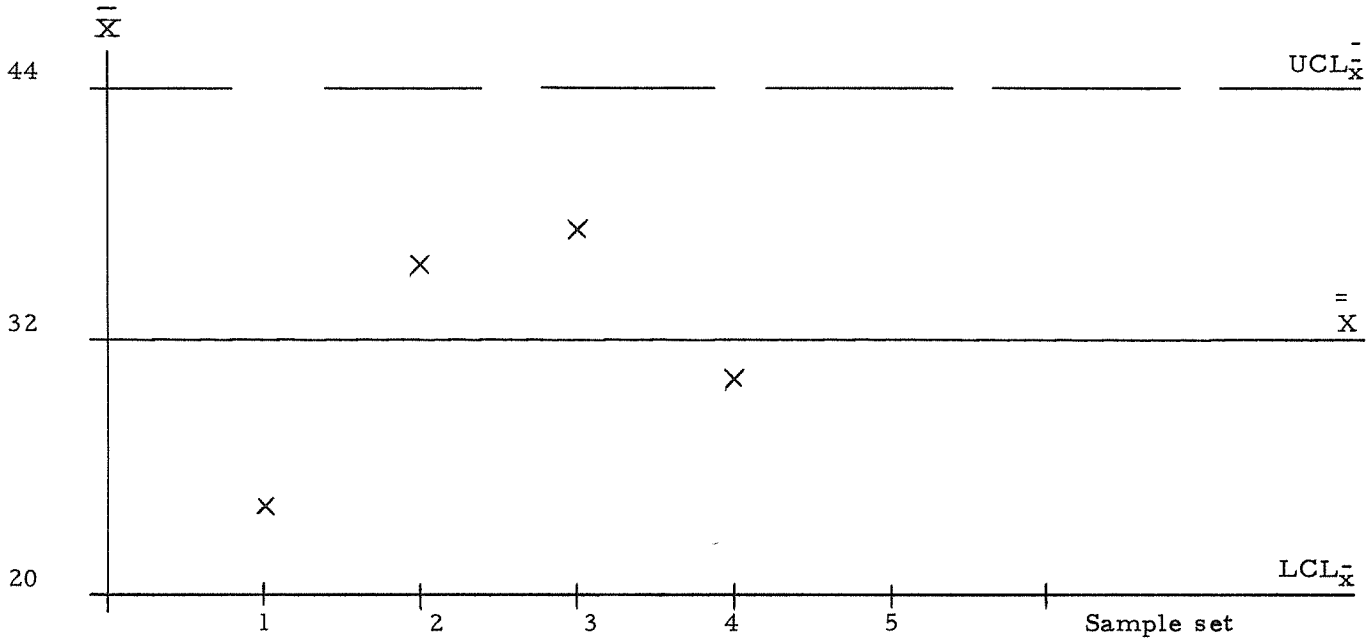
The values of A2 for 3σ deviation are given in a table at the end of this article.

The limits for our example are then:

$$UCL_{\bar{x}} = 32 + 0.58\,(21) = 44$$

$$LCL_{\bar{x}} = 32 - 0.58\,(21) = 20$$

These can now be plotted along with $\bar{X}$ of each sample set.



It is desirable to have at least 25 sample sets in order to set up control limits for a control chart. After this sampling may be infrequent and increased only when a trend is indicated. Trends may be in a variation outside of the $UCL_{\bar{x}}$ and $LCL_{\bar{x}}$ limits, a series of value on one side of $\bar{\bar{X}}$ only, or a steady increase or decrease in $\bar{\bar{X}}$. Any one of these would indicate that the system has gone out of control. The

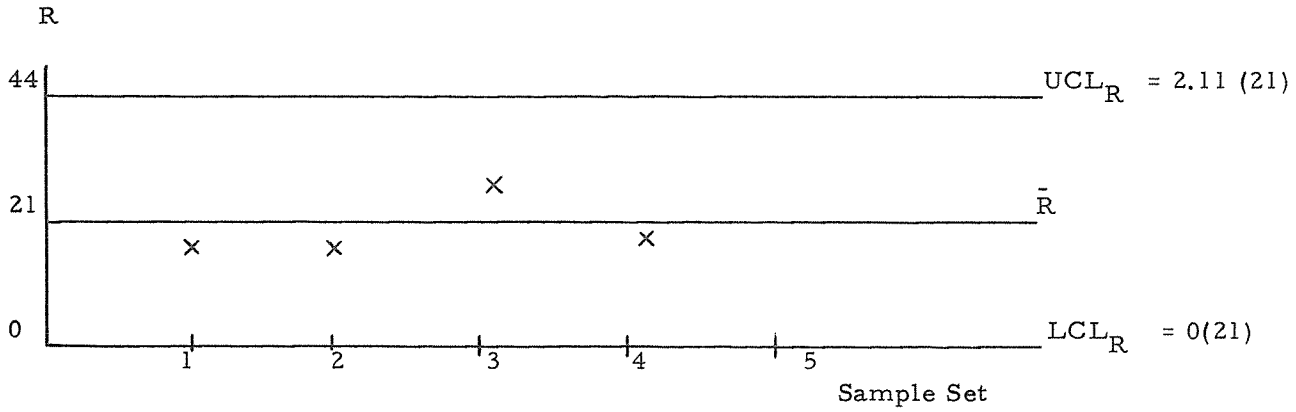
The process dispersion is measured by construction a similiar chart of variations. Limits are dtermined in a similar manner

$$UCL_R = D_4 \bar{R}$$

$$LCL_R = D_3 \bar{R}$$

D_3 and D_4 are also contained in the table at the end of this article.

The control chart for dispersion is then



If a machine adjustment changes permanently the $\bar{X}$ values will shift but not the R values. Tool wear will produce a trend shift. A careless machinist or one continually adjusts his machine in an attempt at perfection will produce variations outside limits on the R chart.

The Shewhart model described then is an inexpensive method of quality control which once installed and accepted is superior to the familiar go - no go system of sampling. It is based on the fact of normal distribution in items subject to chance variations only and assists in determining assignable variations. Any degree of tolerance decided upon can be used.

(continued on page 9)

(CAPACITOR-DISCHARGE from page 5)

significance in a C-D system. The extremely fast rise time means that the spark occurs at the plug virtually instantaneously after the distributor tells the C-D system that the ignition timing point has been reached. The C-D system does not depend on an intermittent 'charging' of an ignition coil as do older systems. Spark plug life is extended up to four times the normal span. This is credited to two factors.

Because of the C-D system's ability to fire fouled plugs, the plugs can be kept in service beyond the point where they would normally be discarded. Due to heavy deposit build-up and the practical difficulty of effectively cleaning some types of fouling deposits, many plugs were thrown away even though gap wear was not excessive.

Gap growth in spark plugs was reduced by 4/5 during tests run by Prestolite. The test program was on an eight cylinder engine operated for up to 200 hours at 3000 rpm. With the C-D system, spark plug gap growth was just about .002 inch in the 200 hours (equivalent to 10, 000 miles at 50 mph). With the conventional system, gap growth was over .010 inch, and still higher for the transistorized system also tested. Some C-D ignition engineers feel that spark plug life can be extended to 100, 000 miles.

How It Works - Actual operating sequence in the C-D system is quite simple. It operates to charge a capacitor to a high voltage, which on a signal from the distributor is discharged through the ignition coil primary to fire the spark plug.

Several different systems are on the market. One system, designed and tailored for original equipment installation on an engine, is not adaptable for after-market installation. Other systems can be installed on existing vehicles; some of these systems retain the original distributor and coil, though engineers generally agree that superior performance is obtained with a special coil made specifically for the characteristics of the C-D system.

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MONITORING VARIABLES

Factors for Determining from $\bar{R}$ the 3-sigma control limits for $\bar{X}$ and R Charts.

Number of observations in sample set n	Factor for $\bar{X}$ chart A_2	Factors for R Chart	
		Lower control limit D_3	Upper control limit D_4
2	1.88	0	3.27
3	1.02	0	2.57
4	0.73	0	2.28
5	0.58	0	2.11
6	0.48	0	2.00
7	0.42	0.08	1.92
8	0.37	0.14	1.86
9	0.34	0.18	1.82
10	0.31	0.22	1.78
11	0.29	0.26	1.74
12	0.27	0.28	1.72
13	0.25	0.31	1.69
14	0.24	0.33	1.67
15	0.22	0.35	1.65
16	0.21	0.36	1.64
17	0.20	0.38	1.62
18	0.19	0.39	1.61
19	0.19	0.40	1.60
20	0.18	0.41	1.59

Upper Control Limit for $\bar{X} = UCL_{\bar{x}} = \bar{\bar{X}} + A_2 \bar{R}$

Lower Control Limit for $\bar{X} = LCL_{\bar{x}} = \bar{\bar{X}} - A_2 \bar{R}$

(If the aimed-at or standard value $\bar{X}'$ is used rather than $\bar{\bar{X}}$ as the control line on the control chart, $\bar{X}'$ should be substituted for $\bar{\bar{X}}$ in the preceding formulas.

Upper Control Limit for R - $UCL_R = D_4 \bar{R}$

Lower Control Limit for R = $LCL_R = D_3 \bar{R}$

All factors in this table are based on the normal distribution.

Role and Function of Materiel Command

[In the January 1967 issue of the Bulletin, we printed a part of Major General RP Rothschild's speech to the Canadian Industrial Preparedness Association in Montreal, October 20, 1966. Space did not permit more and we must apologize for the very abrupt ending of the first 'episode'. Here, in response to many requests, is the remainder of that speech, with a 'proper' ending. --Editor]

HOW MATCOM OPERATES

I would like to discuss the scope of our operation and some of our problems. For some time to come, we must operate three separate supply and maintenance systems.

The Navy has a centralized inventory control using conventional punch card and tabulating equipment. The Army has a decentralized inventory control, again using conventional punch card and tabulating equipment. The RCAF on the other hand has a centralized inventory control system using a computer tied into sending and receiving equipment.

As you can see there are basic differences in these three systems. While each was adequate for the organization it was designed to support, none of them is adequate to meet the present organization and roles of the functional Commands.

Furthermore, each of these systems was developed some time ago and while improvements were continually being made, such improvements were in the nature of modifications to existing systems and consequently quantum improvements could not be made. Now that we are developing a fully integrated system we have the opportunity to institute a new system using the latest management techniques, automatic data processing and communications equipment.

In order to make the transition from three systems to one as smooth as possible we will continue to modify the existing systems by integrating where possible the management of items which are common to the three services. Such changes will only be made where commonality of items warrants the inevitable disruption.

These changes have one aim in mind and that is to help us make the supply system more efficient. Studies are now being, or have been carried out on our distribution system. These studies, along with the DEVIL program, which I will discuss later, will point the way to our future integrated supply and maintenance system.

As you are undoubtedly aware, each service now operates three major wholesale depots. The Naval depots are situated close to the major users of the materiel (ships and dockyards) and are located at Halifax, Esquimalt and Montreal. The Air Force has depots in Moncton, Toronto and Edmonton. The Navy and Air Force operate what we call composite depots; that is to say, they normally carry the full range of materiel for the customers they support.

The Army maintains Central Ordnance Depots or CODs in Montreal, London and Cobourg. These Army depots differ from the Navy and Air Force in their concept of operation, in that they are commodity depots holding a selective range of materiel, and supply the users no matter where they are located. The demanding system differs between the services, in that the Navy and the Army have a decentralized procedure. This means that the depots make the issue, and on a cost-posting inform the inventory control. In the Air Force, the demand is fed directly into the computer. There are differences in the grouping of technical and supply personnel and the responsibility for maintenance orders and maintenance instructions.

WIDELY DISPERSED AMMUNITION DEPOTS

Materiel Command has the task of administering the ammunition depots (OAD) at various locations:

34 OAD at Ste. Therese, Quebec.

32 OAD at McGivney, NB.

36 OAD at Dundurn, Sask.

13 Explosives Depot at Angus, Ont.

Naval Ammunition Depot at Halifax.

Naval Ammunition Depot at Renous, NB

Rocky Point Naval Ammunition Depot at Esquimalt, BC.

Many of the personnel in Materiel Command are employed in the repair and overhaul business. The Navy has two dockyards, one in Halifax and one in Esquimalt. The Air Force has a large repair depot at Trenton and has just moved their Mobile Support Equipment Unit from Toronto to London, Ont, and has amalgamated with the Army units already in London. The Army has two base workshops, one in Montreal and one in London.

The philosophy of repair in the services is the same and so is the aim, but the method of achieving the aim varies with the service. The Army and the Navy do most of their maintenance in-house and put relatively little of it out to contract. The Navy contract out their very large items such as the Bonaventure, and she is undergoing refit at the moment. The Army and the Navy have a great number of different items of a particular military nature whose servicing is quite irregular. This type of equipment does not lend itself to continuing civilian contract. However, for civilian pattern vehicles the Army and the Navy do have open-ended contracts for their repair.

The Air Force, on the other hand, put out 90 percent of their repairs to civilian contract. There are several reasons for this. Firstly, the type of repair done by the Air Force lends itself to scheduled maintenance and hence to a continuing civilian contract. Furthermore, the cost of the test and repair equipment, as well as the specialist personnel required, would be far too costly to retain in the system.

To summarize the principal differences, the Air Force have many high cost complex items of equipment which lend themselves to repetitive maintenance. The Army and the Navy have large numbers of dissimilar items of a purely military nature in small quantities.

LOGISTICS,
OPERATIONAL EFFECTIVENESS

As was pointed out we are operating on three supply and three maintenance systems, all with merits, but all out of date for our new posture. Our objective is to design a supply system which will best meet the needs of the Canadian Forces. Studies are underway in Canadian Forces Headquarters and at Materiel Command Headquarters to achieve this end, but the objective will not be met until the early 1970s.

The supply system must be able to supply quick and positive response to the needs of the users. It is obvious that along with the supply system there is a requirement for a rapid and a reliable flow of data. This, of course, is essential to management in the support of any supply system. The organization at the moment envisages one master inventory control point or ICP physically located at Materiel Command Headquarters in Rockcliffe. Studies on warehousing and distribution costs are being conducted and the ultimate location of our composite depots will depend on the results of these studies.

I have tried to show you rather briefly how we see the logistic organization being set up, but as I must continually stress we are still using three systems and the disruptive effect on the operational Commands would be enormous if we tried to quickly change these systems without a great deal of preparatory ground work. We have been charged by the Minister of National Defence not to disrupt the operational effectiveness of the forces and we cannot call a halt to our international commitments and obligations just so that we can change our system. We will endeavour to integrate those items which, because of their common nature, lend themselves to single management. We will continually liaise with the operational Commands to ensure that our logistic organization meets their requirements; after all that is our raison d'etre. It is mandatory that the logistic

organization be responsive to operational needs.

PLANS FOR THE FUTURE

As I have said before there is a very hard working group at Canadian Forces Headquarters with whom we are in constant touch. This group, commonly known as the DEVIL group, is planning the complete integration of the supply services of the Canadian Forces, in line with the March 1965 White Paper on Defence.

The overall objectives of the DEVIL program is to design a supply system for the 1970s and beyond. The supply system envisaged must evolve from the need for a quick and positive response to the requirements of the ultimate users and the attendant need for a rapid, reliable and usable flow of data essential to management in support of that response. Against that specific background the detailed objectives of the Canadian Forces supply system fall under one or more of the following broad headings:

Commonality: The system must be as far as possible a single standardized system catering to the control and distribution of all the different kinds of materiel used by the Canadian Forces.

Effectiveness: It must be effective in peace and war and provide timely satisfaction of the user's needs.

Efficiency: The system must, of course, be efficient in terms of management overhead, operating costs and inventory holdings.

The supply system must achieve compatability with the practices and procedures of the Department of Defence Production and our principal allies.

The Canadian Forces supply system will be a total system integrated vertically by standard methods, procedures, formats and data flow. To that end, automatic data processing equipment, including a rapid communication linkage will be provided to operate the system effectively and efficiently.

AUTOMATED SUPPLY TO REPLACE THREE SYSTEMS

In summary I hope I have given you an idea of how we in Materiel Command work now, and how we intend to work in the future. I would like to leave you with several important points.

Firstly, the development and implementation of a single automated supply system to replace the three systems we now use will not be in effect until the early 1970s. We have taken, and are continuing to take, steps towards our goal.

We will continue to consolidate overlapping activities and transfer the appropriate classes of materiel to single management. We will do this when such action is consistent with, and will ease the problem of, reaching our objective - the single integrated supply and maintenance system. During this transitional period we cannot allow our support to suffer and we will keep disruption to an absolute minimum.

Finally the single integrated system must be capable of meeting the needs of the Canadian Armed Forces in peace and in war.

CFB Moose Jaw, Sask

Dear Sir:

The last issue of the quarterly was topical and timely. Section Technical Officers here were detailed to prepare briefs prior to a forthcoming visit by the Commander, Materiel Command. Quite naturally, questions were asked about the functions of Materiel Command. Considerable time was spent in searching unsuccessfully for answers.

Then the Jan issue of the Technical Bulletin arrived. On page 31, Maj Gen Rothschild explained the role and functions of Materiel Command. Touché and thank you.

Capt JJ Kane

Thank you for those kind words - it's good to know we've been of service. Too bad we hadn't included the complete speech by Maj Gen Rothschild, but thought it would be so long nobody would read it. - Editor

A WRECKER is a sometime thing

By Lt JI Hanson

The advent of the APC* has provided the Recovery Platoon of 4 Field Workshop with some interesting new recovery problems. One of the grandpappies of them all occurred during the 1966 divisional scheme, Exercise Checkmate, last October.

A company of 2 RCR was holding a hill in the Hildesheim area of the Teutoburger Wald during a later stage of the exercise. In an effort to get a better view of his front, one of the APC commanders moved his machine forward in the black of night to the very edge of the woods. Because it was so dark he came too close to the edge of sharp slope; slithered over it; endured a wild nightmare ride to the bottom; plunged over the lip of a gulch at its bottom, and squelched into the slime at the bottom of the gulch. Fortunately, no one was injured.

Realizing that recovery was beyond unit resources, (ie, an M62) the RCR summoned the hard-chargers of Recovery Platoon. Under their capable ramrod, Sgt Chuck Winters, the Recovery crew arrived and, at first light, surveyed the scene. The first picture show Cpl Carter standing on top of the APC which sits in the small gulch.

A careful survey of the area revealed that the slope down which the APC had tobogganed was good old thick, gooey, stick-to-the-bottom-of-your-boots, slimy, irritating Westphalian muck thinly overlaid with leaves. It offered no purchase to the wheels or tracks of any possible recovery vehicle for towing a casualty up the hill; yet a recovery vehicle had to be positioned here because of the limitations imposed by winch cable lengths.

The typical recovery mechanic is nothing if not crafty, and those in 4 Field Workshop are no exception. Before long they had come up with a workable solution.

Using the platoon 20-ton lowbed trailer, the workshop 'Cat' was quickly brought to the scene. Some shrewd wheedling, combined with tears, threats and a little horsetrading, secured the loan of an ARV# from the Strathconas. This the platoon fetched, complete with crew, with one of their two 60-ton tank transporters.

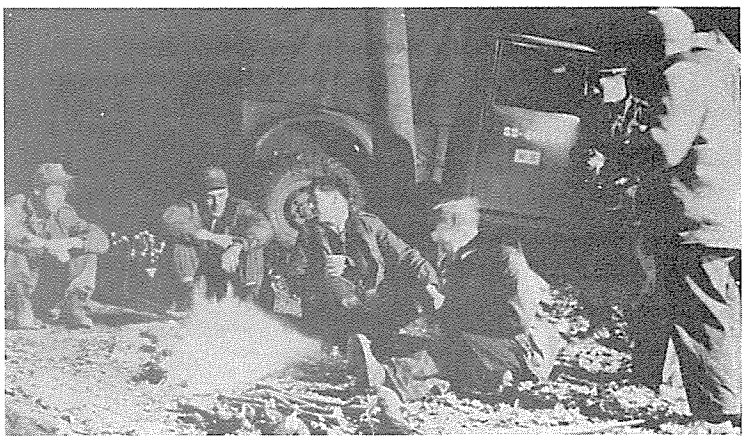
To extricate the APC from the gulch, the Cat was carefully moved down to the bottom of the slope. Next, a two-to-one hookup was contrived from the Cat's winch to the mired carrier. The APC was then winched up to a position immediately behind the Cat at the foot of the slope.

Picture two shows the recovery commandos then running a cable from the ARV, perched at the top of the hill, down to the Cat, which would have had difficulty negotiating the slope, let alone with an APC on tow.

Picture three shows the Cat being winched up the hill by the ARV (crewed, incidentally, by RCEME people with a Strathcona radio man). You can get some idea of the type of footing on the slope from this picture - a man gains 20 pounds every time he takes a step. The APC is out of sight just behind the Cat.

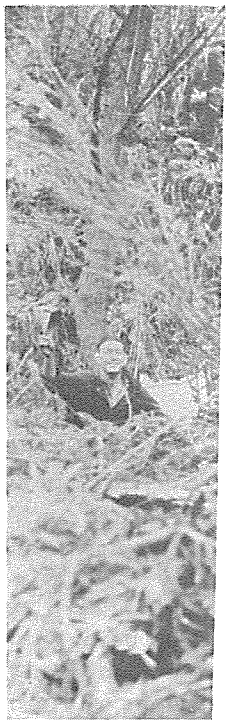
Picture four shows the final result - the ARV hooked to the Cat hooked to the APC. Only the heads of the APC crew are visible - the carrier itself is just over the lip of the slope.

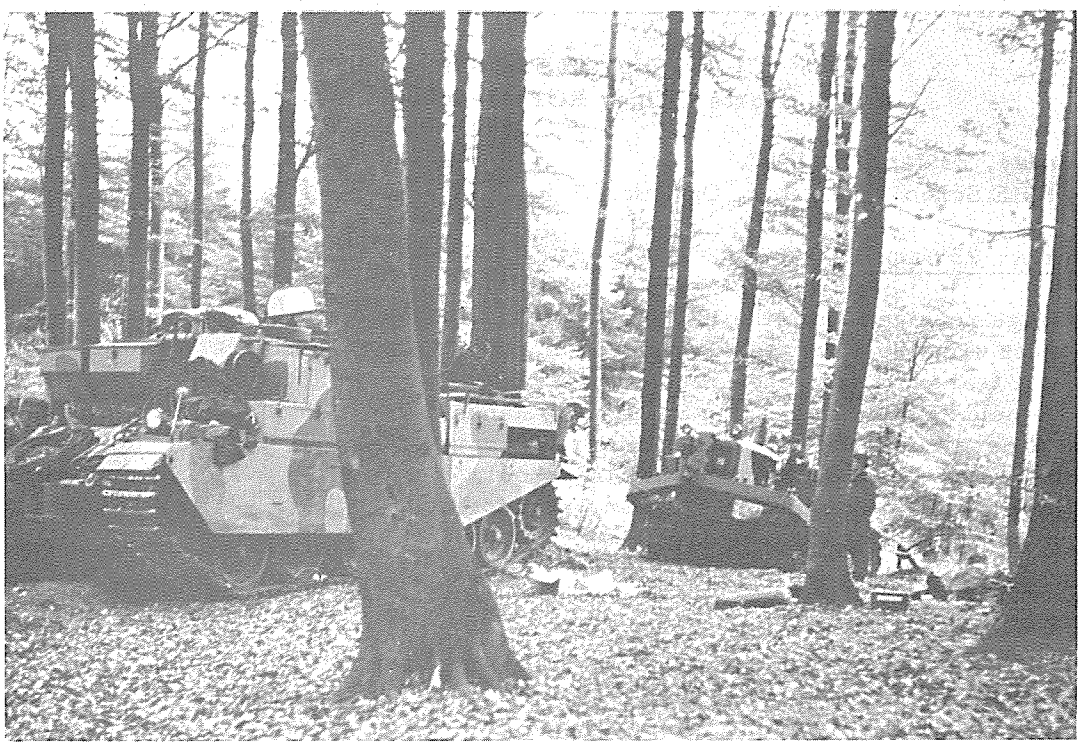
At this stage of the game, everything was unhitched, and the APC crew proclaimed qualified bobsledders. Someone produced several bottles of snap-cap, some bockwurst and brot, and a minor celebration ensued. As the sun slowly sinks in the west, the various soldiers (RCEME, RCR and Ld SH) involved relax around a roaring fire, the very picture of integrated bliss.

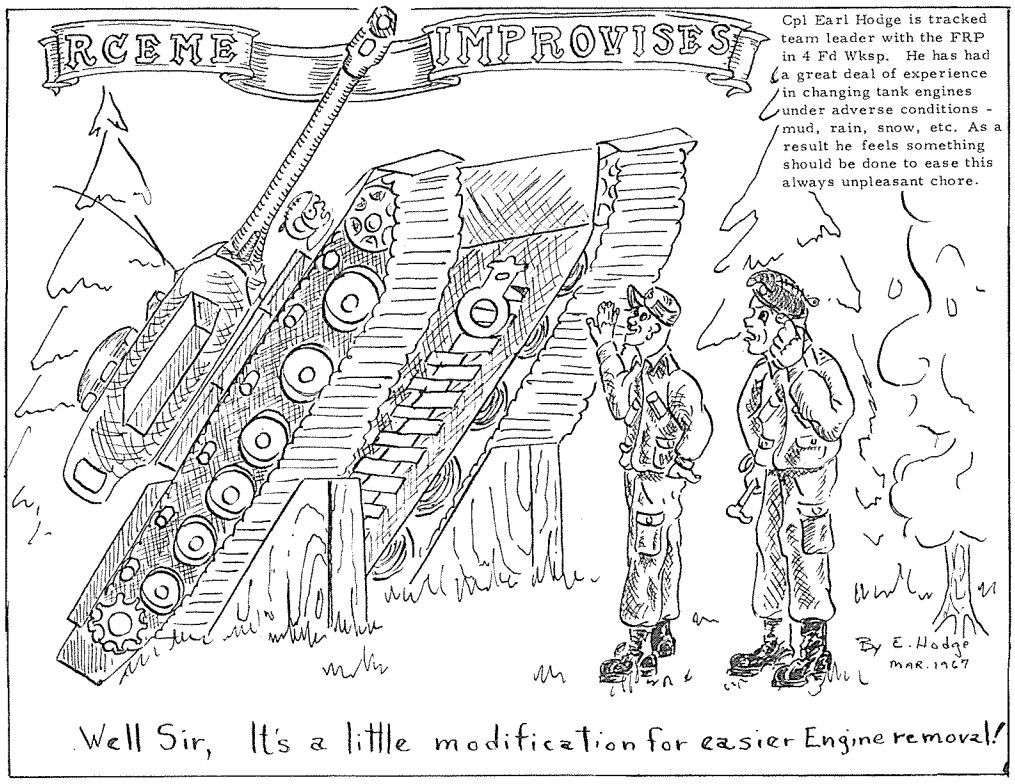


*M113A1 Armoured Personnel Carrier

#Armoured Recovery Vehicle






RCEME
IMPROVISES
Cpl Earl Hodge is tracked team leader with the FRP in 4 Fd Wksp. He has had a great deal of experience in changing tank engines under adverse conditions - mud, rain, snow, etc. As a result he feels something should be done to ease this always unpleasant chore.
By E. Hodge MAR. 1967
Well Sir, It's a little modification for easier Engine removal!

... a page from the RCEME SCHOOL sports diary

By Capt JH Fawcett
Sports Officer RCEME School

Date line: Monday, 23 January 1967.
RCEME School, Kingston, Ontario.

Day 1: Monday, 23 January 1967

Message received from the Kingston Winter Carnival Committee.
Request volunteers from Apprentice Company RCEME School to enter a team in a snowshoe race as part of the carnival activities.
To be held at the city park on Sunday, 29 January 1967.
The course to consist of a 2 1/2 mile trek around the park.
Approved by Chief Instructor RCEME School.
Volunteers from Apprentice Company requested.
6 senior apprentices volunteered.

Day 2: Tuesday, 24 January 1967

Requested 6 pairs of snowshoes from Quartermaster.
None in stock; however Quartermaster will try to procure same.
Weather outside beautiful. Temperature 50°. No snow.

Day 3: Wednesday, 25 January 1967

No further news on snowshoes.
No snow.
Volunteers request training program to be arranged for 1800 hrs each evening until Saturday 28 January, 1967.
Arranged.
Instructor available.

Day 4: Thursday, 26 January 1967

Contacted Quartermaster, still not able to procure snowshoes; awaiting reply from possible source of issue.
Weather continues to be exceptionally mild.
No snow.
Two volunteers have decided to apply for weekend pass and request to be dropped from the team.

Day 5: Friday, 27 January 1967

Consider that snowshoe race will be cancelled due to lack of snow.
Contacted Kingston Carnival Committee member and was informed that snowshoe race will not be cancelled.
Phone call from RCAF weather expert, "snow expected".
1600 hrs - Snow falling. However, still no snowshoes.
1630 hrs - Contacted Quartermaster. Snowshoes located at 1 Canadian Signals Regt.
Snowshoes arrive at Apprentice Company.
Issued to volunteers.

1655 hrs - Instructor not available, going on weekend pass.

Day 6: Saturday, 28 January 1967

Concentrated training, not one volunteer has ever worn snowshoes previously.
Morale low.

Day 7: D Day 1400 hrs Sunday, 29 January 1967

Team having trouble at start line, insults flying back and forth between teams.
Senior Apprentices now mad enough to win race backwards.
Result. Race won by the RCEME School Apprentices (not backwards).
Each team member presented with a fur cap.
Molson Shield awarded to the RCEME School to keep until January 1968.
Team to be congratulated for a fine display of sportsmanship-

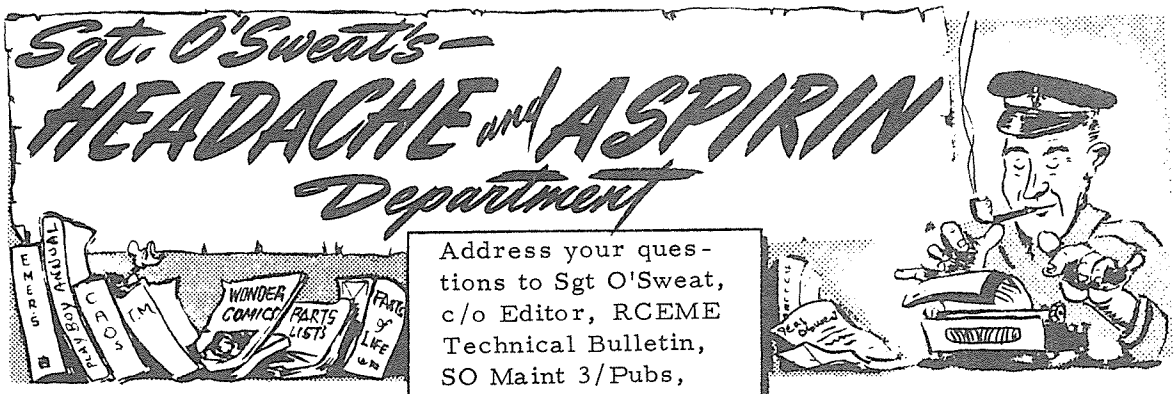
Cfn (App) Les Orcutt (Captain)
Cfn (App) John Barber
Cfn (App) Jake Jacobs
Cfn (App) Fred Williams

Equipment to be returned to Quartermaster.

NOTE: First sports award for 1967 Centennial Year to RCEME School.

BLAZING THEIR WAY TO VICTORY

Charging over the finish line: Jake Jacobs (partially hidden), John Barber, Fred Williams, and team captain Les Orcutt.
-Cpl W Baird photo


Sgt. O'Sweat's—
HEADACHE and ASPIRIN
Department
Address your questions to Sgt O'Sweat, c/o Editor, RCEME Technical Bulletin, SO Maint 3/Pubs, CFB Rockcliffe, Ont
WONDER COMICS
PARTS LISTS
FACTS of LIFE

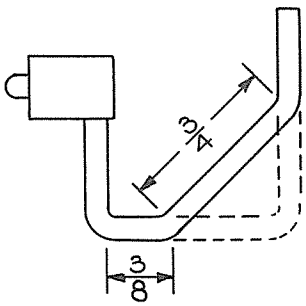
Dear Sgt O'Sweat;

I read an article in the July 66 issue of the RCEME Bulletin of a problem with the lever breaking off the plunger in the 105mm sight and that it should be redesigned. I agree.

I noticed in a later issue, a drawing with dimensions, etc, which I tried. I found the idea good but when the plunger was disengaged and rotated into the unlocked position, the sight linkage bears against the lever and pries the lever off at maximum elevation.

However if your idea is modified it works quite well. We are now using the idea on our equipment and find it much better than the original.

The drawing will show the modification.



GB Stanley Cpl
C Sqn LdSH Maint Tp

Dear Cpl Stanley;

Thank you for crediting me with the idea of the original fix but I am afraid I must admit it came from a man in the design directorate.

I will pass your modification to his fix along to him and in the meantime am sure that all concerned will be grateful for this word from you.

Sgt O'Sweat

Dear Sgt O'Sweat;

In reading through some back issues I came across a letter from Ssgt RC Brimmage in the January 1966 edition, in which he stated a method which could be used to speed up the issuing of repair instructions to the people who use them.

Your answer effectively shot down the feasibility of including such instructions as a part of the Technical Bulletin. However the requirement for the earliest possible issue of instructions to the technician is still with us,

I would like to suggest the publication of Provisional EME Manuals. This system is at present used for British EMER's and makes existing information available as a guide for the technician until properly proven and edited manuals can be issued. The provisional manual fits directly into the EME Manual system of numbering and is directly superseded by the properly published instruction.

Provisional manuals will improve the repair service for user units while giving the technician the opportunity of developing new repair techniques and encouraging suggestions of better repair methods.

How about publishing the pertinent RCEME School precis as Provisional EME Manuals? A lot of research and work has been put into writing these precis for instructional purposes. Isn't it time that we accepted them for repair purposes until a proper manual can be published.

WE Davis WO2

Dear QMS Davis:

Much thought is being given to this matter of repair instructions, so more anon.

Sgt O'Sweat

ALL ONTARIO RCEME BONSPIEL

By Major BM Deibert

On 13 and 14 Jan 1967, the Base Maintenance Section of CFB Borden hosted a bonspiel which in latter days was known as the RCEME Central Command Annual Bonspiel. Thirty-eight rinks from Ottawa, Petawawa, Kingston, Picton, Toronto, London, Meaford and Borden took part in this event. Once again it provided the participants with a pleasant opportunity to meet old friends, make new acquaintances and, incidentally, do a fair amount of curling in two days in an atmosphere of friendly rivalry (we think).

Competing rinks were divided into three groups and the point system was used for scoring. Each team played four games. The 14 Coy RCEME Trophy was awarded to the rink with the highest number of points. This rink was skipped by the RSM of The RCEME School, WO 1 Don Campbell. The runner-up was also a Kingston rink skipped by Ssgt Ron Sales who had been posted to Kingston from Petawawa only a few days before the bonspiel. His rink won the 2 Fd Wksp/8 Coy RCEME trophy. Some excellent prizes were won by the lucky rinks in each group.

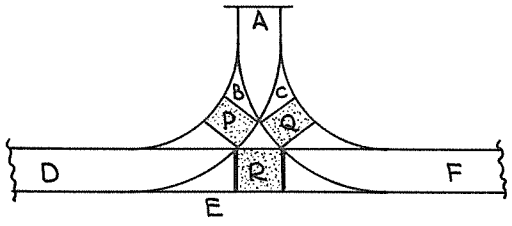
A sprinkling of RCAF curlers on Borden and Toronto rinks provided an interesting change this year. They represented the air force element in our maintenance sections. Integration will no doubt affect the future of this annual event but we sincerely hope that it will be perpetuated in some form. Major Dave Geary, CO of 2 Fd Wksp RCEME, has kindly consented to organize this spiel in Petawawa in 1968. We are looking forward to it and hope that all you fortunate curlers who are in Ontario next year at this time will keep an eye open and set aside some time for this event. See you there.

Major Mike Deibert presenting the 14 Coy RCEME Trophy to WO 1 Don Campbell. With him are Sgt Boom Boomhour (vice), Sgt Ed Winters (second) and Sgt Ken Moore (lead).

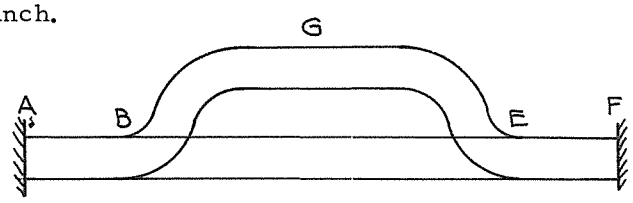
Major Dave Geary presenting the 2 Fd Wksp/ 8 Coy RCEME Trophy to Ssgt Ron Sales with Sgt Bob Noble (vice), Ssgt Gord Turcotte (second) and Capt Bill Laird (lead) grinning exhuberantly along with him.

GAMES OF POSITION

1. The puzzle shows a railway, DEF, with two sidings, DBA and FCA, connected at A. The portion of the two sidings which is common is long enough to permit a single car, like P or Q, to be contained; but is too short to contain the whole of an engine, like R. Thus, if the engine runs up one siding, such as DBA, it must come back the same way. The problem is to use the engine, R, to interchange the cars P and Q without violating the above mentioned restrictions.



2. A loop line BGE connects two points B and E on a railway track AF, which is blocked at both ends, as shown in the diagram. In the model, the track AF is 9 inches long, AB=EF= 1 3/4 inches, and the width of the track is 1/4 inch.



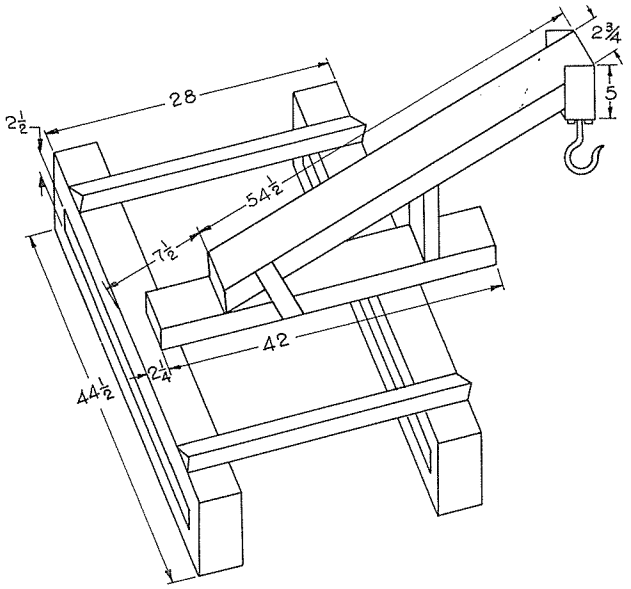
On the track from A to F there are eight cars numbered successively 1 to 8, each 1 inch long and 1/4 inch broad. An engine, R, of the same dimensions is on the loop. The construction and initial arrangement ensure that at any one time there cannot be more than eight vehicles on the track from A to F. Also, when there are eight vehicles on the track, only the vehicle at either end can be moved on to the loop, but if less than eight are on the track, then the last two vehicles at either end can be moved onto the loop. If the points at both ends of the loop are clear then the track will hold four, but not more than four, vehicles. The object is to reverse the order of the cars on the track, so that from A to F they will be numbered successively 8 to 1. Note, the cars may be moved without use of the engine.

3. Arrange the passage of a river by three men and three boys who have the use of a boat which will not carry at one time more than one man or two boys. Try to find the solution to this problem which involves the minimum number of passages.

4. On a row of seven squares are located three white pawns and three black pawns as shown. Each piece can move only in one direction; the white pieces can move from the left to right, and the black pieces can move from right to left. If the square next to a piece is unoccupied, it can move on to that; or if the square next to it is occupied by a piece of the opposite color and the square beyond that is unoccupied, then it can leap over that piece onto the unoccupied square. The object is to change the position of the black and white pawns.

W	W	W		B	B	B

Send queries to Capt RE Betzner
CFPO 5049 UNEF (Gaza)



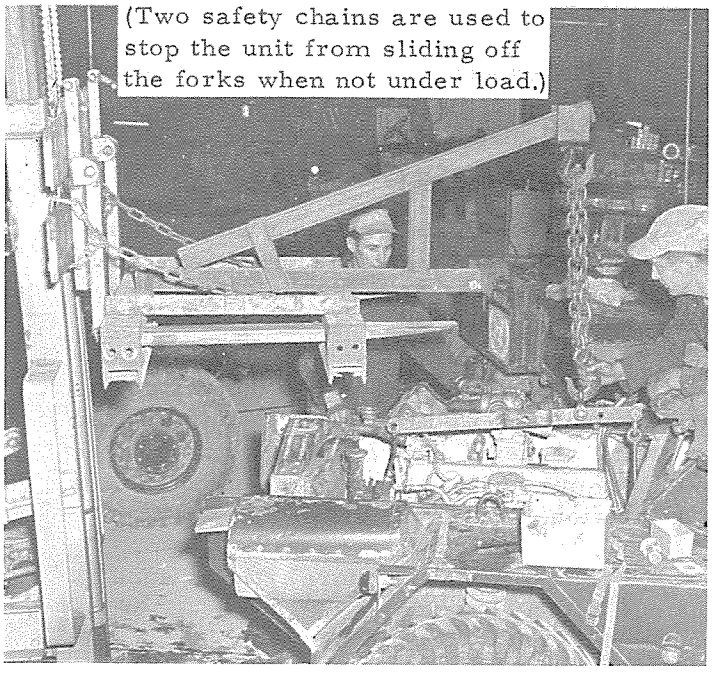
Lifting Device Mk 2

The lack of a wrecker, mobile crane, or other adequate lifting device with the RCEME Detachment in Cyprus made the changing of engines in the 2 1/2 ton trucks and Ferrets both difficult and hazardous. So the Detachment went to work and designed a lifting device to fit on a forklift, as we have an old Cockshutt 30 tractor used for unloading the weekly Yukons.

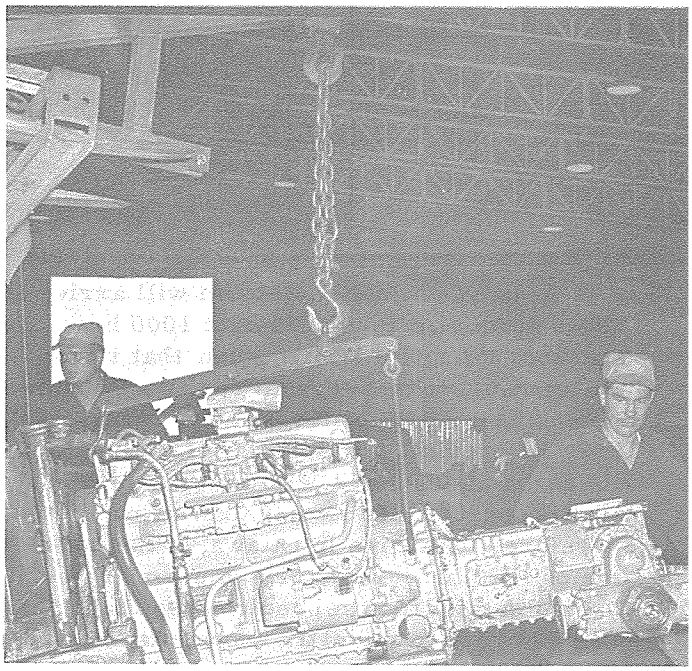
The Mk 1 version of the lifting device did not do everything required of it, so we now have the Mk 2 complete with swivel hook; it is very successful.

This device was made entirely out of scrap metal. One of the main attractions is that it can be picked up or laid down exactly in the same manner as an ordinary wooden pallet used with the forklift. It can easily be fabricated by any RCEME unit having a welder.

The accompanying photographs were taken in the new workshop during a Ferret engine change.



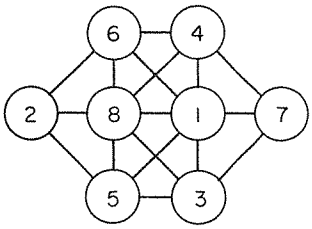
(Two safety chains are used to stop the unit from sliding off the forks when not under load.)



Simple or Difficult ?

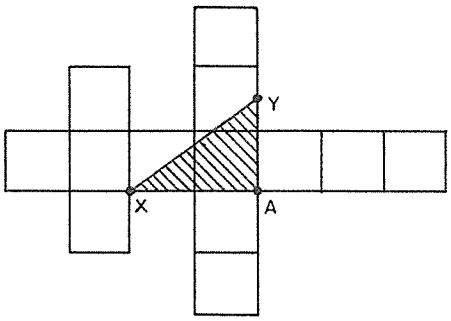
Answers to Problem Set #4

1.



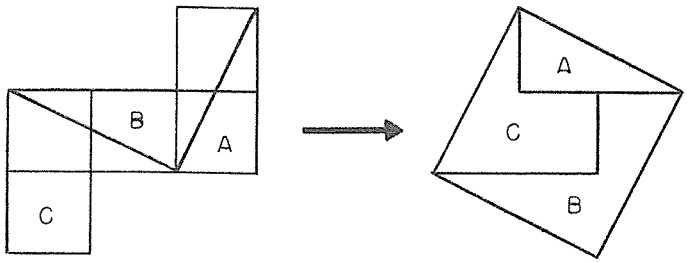
2. A line drawn from the point, X, to the point, Y, the midpoint of the side of the square, divides the figure into two equal parts.
Proof:

The line joining the points X and Y is the diagonal of a rectangle two units in length and one and one-half units in width. Thus, the area of the triangle XAY is one-half the area of this rectangle and is equal to one and one-half square units. It can then be seen that the area of that portion of the cross containing the triangle XAY is six and one-half square units (i.e, 5 + 1 1/2 = 6 1/2). Since this is half the total area of 13 square units, the cross must be divided into two equal parts by the line XY.



3. A man is told that a storm will arrive in Ottawa from the South West at 1000 hrs. He estimates its speed to be such that it should take two hours to travel from Toronto to Ottawa (the position of both cities is known accurately). Thus, he predicts the storm's arrival at Toronto as being 0800 hrs. However, the speed, which is constant, is slower than he predicted. Therefore, to arrive in Ottawa at the correct time of 1000 hrs, the storm must arrive in Toronto earlier than he predicted so that it has sufficient time to travel the known distance between the two cities.

4.



5. Let a = 1234567890.

Then the equation becomes

$$\frac{a}{(a+1)^2 - (a(a+2))} = \frac{a}{a^2+2a+1-a^2-2a} = \frac{a}{1} = a$$

The answer is 1234567890.

Letter to the Editor

Sir:

Enclosed you will find a submission for the Technical Bulletin as invited by Major P Bateson in his paper "The Practical Aspect of RCEME Field Operations. (See page 23)

Unlike Maj Bateson I cannot base my paper on practical experience, but I have spent the past 3 years teaching the subject.

My reasoning is based on logic. Questions and observations made by students during various courses on ROF have also influenced my point of view. Hence the reason for the title of my small, but I hope, constructive contribution.

I hope to see many more articles such as the one by Maj Bateson.

L Guilbault Ssgt

THE LOGICAL ASPECTS OF RCEME FIELD OPERATIONS

By S Sgt L Guilbault

The practical aspect of RCEME field operation by Major P Bateson was most interesting. Let me put in my two cents' worth.

Instead of dealing with CAMT 11-3 as did Major Bateson, my comments will be on CAMT 11-2 (RCEME in the Field) and in particular one aspect of the system of recovery as detailed in Chapter 3, of the latter pam.

According to this pamphlet (para 308 c (3) (5),) one of the duties of the Backloading Point (BLP) party is to classify casualties and to channel some of the casualties to the field workshop.

Plate 1 of CAMT 11-2 shows the flow of casualties from the field workshop to the BLP but not vice versa. Therefore this point is contradictory.

The same pamphlet (para 309 c) also states that the Equipment Collecting Point (ECP) is merely a collection point and that no classification of casualties will take place there.

Any equipment placed in the BLP is there to be backloaded to rear repair facilities. Furthermore, this is the point where the crew leaves the equipment and a BLR certificate is issued authorizing them to draw a new piece of equipment, and return to their unit (CAMT 1-11 para 1814). The casualty is backloaded outside the brigade area.

Now, if according to CAMT 11-2 the equipment is to be classified at the BLP, this means that equipment casualties must be backloaded to the Brigade Administrative Area (BAA) before a decision is made as to which RCEME facility will do the job.

Would it not save time, travel and confusion to have the equipment casualties classified as far forward as possible? This could be at the ECP or even the unit. Surely the unit tradesman must be qualified to say if the equipment is beyond unit repair. And only then should the equipment be sent to the ECP. (I know! This is what is being done; but it is not what the manual says.)

The present system is that the equipment casualty is taken to the ECP and from there backloaded to the BLP or to the field workshop.

How and with what authority is the decision made as to where the casualty should be backloaded, since classification is done only at the BLP?

A Y1 casualty should go to the field workshop for repair. A higher classification would go to the brigade BLP to be backloaded. Why the loss of time and effort of channelling the casualty to the field workshop, then the BLP or vice versa?

By having the casualties classified at the ECP unnecessary steps could be eliminated:

a. The recovery team would know exactly where to take the casualty;

b. The crew would not need to accompany the equipment if the classification was Y2 or Z.

The BLP at brigade, just as in any other formation, should be no more than a main junction point and should be used only as the name implies, ie, Backloading Point. This would mean that no casualty would be placed in the BLP unless it is in fact to be backloaded. How can this be possible if the classification as outlined in CAMT 11-2 is done at the BLP?

Both the ECP and BLP could be the responsibility of the recovery platoon commander who is in constant touch with the field workshop. By having the casualties classified at the ECP, the movement of the vehicles could easily be controlled by the recovery platoon officer.

And while we're at it, why not do the in-inspection to Y casualties right at the ECP? The equipment has to be inspected anyway if it is to be classified.

This is only one aspect of CAMT 11-2 which needs to be reviewed. I am sure that many other points are controversial.

SPANNER SPEAKS

Every dog has its day, and last week was the week of the underdog in 4 Field Workshop.

The first underdog triumph came when our hardcharging basketball team, the Crimson Crushers, met the Transport Company team in the Fort Chambly Gym. After a tense, hard-fought game, the doughty Service Corps team came up with a one-point win. They played a real heads-up game, and although it hurts to say it, probably deserved the win they got.

The second underdog triumph came the following day. The Workshop Scarlet Slashers Hockey Team trounced the Transport boys to the tune of four to two. The Slashers thus won the best-of-three semi-final series and advanced to the finals. A major part of the credit for our win goes to a handful of renegade Service Corps Types who play on our team - especially Bailey in the nets. They were what made the difference.

Friday five more underdogs turned into Top Dogs. These five were the Workshop candidates on the just completed Brigade Jr NCO course. All of them are now back at work sporting brand new stripes. Congratulations to Cpls St Pierre, Perreault, Mahaffy, Bonnetta and Laperriere.

On Monday the Slashers took to the ice again, and again they were favoured to lose. Up against a powerful Signal Squadron team, who as the top league team were supposed to win, our boys just outhustled them and walked away with a three to one win. This puts us one game up in the final series.

The final Underdog of the week is a real canine! This one lives in Soest, and last weekend he made the mistake of biting one of our rugged, rough and tough, hard as a boot RCEME sergeant-majors. The sergeant-major is expected to survive; in fact is thriving, but no one is sure about the dog.

To close we'd like to send get-well wishes to S Sgt Ed McClafferty of FRP, currently languishing in the MRS. We hope he feels better soon, because we sure miss him.

4 FIELD WORKSHOP RETREAT

By Ssgt CA Gattrell

No matter how much one loves his wife, children, or girl friend, it is beneficial to have a Retreat. To members of 4 Field Workshop RCEME this Retreat comes in the form of Sennelager and Soltau concentrations.

Sennelager training is largely that of reclassification on weapons and a refresher on general military subjects. A small amount of operational training is thrown in - like getting there and getting back, plus a few night moves in between. This might sound like a snap, but the repair commitment as a workshop continues, and hardly is the last 'frisky' shelter staked down when the first new work arrives in. Most sections, especially Tels, have a backlog of work with them, and often work evenings and weekends to keep abreast.

With production and training commitments to fill, the morning parades generally look like a game of musical chairs as the selection for training is made from those least needed for production. With this as a starting point the following hypothesis (groundless assumption) can be advanced. Cfn Black was on training yesterday and had his respirator properly fitted, but is working today. Cfn Brown was on production yesterday but is free today to go to the gas chamber and get a snoot full of eye smarter. Cfn White had some First Aid lectures yesterday and has a vehicle casualty today. He has a good memory so has sent for the doctor and is now trying to stop the bleeding.

About half way through this comedy of errors, the fun and games begin as we don full combat attire and spend a few days practicing deployment and night moves. This could require you to be a packet leader without a map, to turn a packet of trucks and trailers around in a sackgasse, or to camouflage a vehicle in the dark. The greatest resource one can have for this operation is a sense of humour.

By the closing week of the retreat all ranks are ready to let off a little steam and generally enough postings and promotions are in by this time to provide an excuse for the occasion. It is on these occasions that new records on consumption are sometimes set. The record cognac intake set by a certain WO2 celebrating his promotion is still remembered and remains unchallenged. The blowout for the men usually takes the form of a games night starting in the late afternoon, with the finals in horseshoe, darts, crib, bridge, etc, withheld until just prior to the barbecue. Those who haven't made it to the finals have no reason to stay sober and it's a wavy line that forms for the barbecue. Any organized entertainment after the food is hopeless without a loud hailer and a suit of armour.

With Sennelager now at a close everyone eagerly awaits the PUFO signal to line up the packets. I have often speculated what it might be like if each driver was allowed to return to base as a free runner for adventure training. With no maps, no rations, no extra fuel and no speed limit, I bet some could make it to the Reeperbahn in an hour.

Close on the heels of Sennelager is the Soltau Retreat. This is an operational training period and entails digging, camouflaging, guards and worst of all, gear. For nearly the entire duration one must suffer the agonies of carrying rifle and respirator, and wearing hard hat and the other paraphernalia which makes up the inventory of what the best dressed soldier should look like. The last light stand-to can last nearly until the first light stand-to if some idiot likes firing blanks better than sleeping.

The greatest hardship of course is trying to carry out normal productive tasks with the added nuisance factor of gear and environment. To be able to continue in our productive tasks under less than ideal conditions is a test of our mettle as an operational unit. The heaviest commitment during training usually falls on the vehicle platoon but nearly every section will experience a brief lull; everyone, that is, but our attached services.

The RCOC Platoon burns the midnight oil with every section that works late and is without a doubt the hardest working element of the workshop. The work of the cooks also continues even if everyone else is 'stood down'. To these unfortunate groups we can only express

(continued on page 30)

SPECIAL TO CORPS OFFICERS' COURSE

During the weekend of 18-19 Feb 67 the RCEME School was host to 17 RCEME Militia officers from Vancouver, Winnipeg, Oakville, Kingston and Halifax Military Districts. Instruction, which was presented by Regimental Company personnel, centered mainly around field workshop operations. The Militia officers, who were preparing for their Special to Corps qualifying examinations, consolidated and clarified their home study while attending this course. A few hours familiarization on the APC M113A1 was also conducted by Vehicle Company.

1. Personnel attending the course were (left to right, seated):

Capt	Y	Takasaki	- Vancouver Mil Dist
Capt	HR	Murray	- Oakville Mil Dist
Lt	GR	Millington	- Oakville Mil Dist
Lt	WE	Mathews	- Kingston Mil Dist
Capt	JE	Vernon	- Vancouver Mil Dist
Lt	JR	Green	- Vancouver Mil Dist
Capt	PD	Murphy	- Halifax Mil Dist
Lt	FL	Kier	- Oakville Mil Dist
Lt	HM	Haddad	- Oakville Mil Dist
Lt	GW	Labelle	- Winnipeg Mil Dist
Capt	AR	McLaughlin	- Halifax Mil Dist
Capt	AR	Lacey	- Kingston Mil Dist
2Lt	HH	Okuhura	- Oakville Mil Dist
Capt	RA	Johnson	- Oakville Mil Dist
Lt	RM	Murray	- Vancouver Mil Dist

Missing from photograph were:

Capt	RH	Felstrand	- Winnipeg Mil Dist
Lt	RD	Gurevich	- Winnipeg Mil Dist

2. Instructors shown are (left to right standing):

WO 2	Monkman	WWB
Capt	DE	Wilson
Sgt	Duffin	RR
Ssgt	Guilbault	L (On cloth model)

SUGGESTION AWARD

TELLUROMETER ANTENNA EXTRACTOR

by Lt GR Walker

Cpl LG Lee, a Weapons Technician hand, from Calgary Base Maintenance Company RCEME, designed and developed a tool for extracting and replacing the antenna on the Tellurometer.

In 1963, shortly after the electronic surveying instrument known as the Tellurometer was produced, six instruments arrived at the Royal Canadian School of Artillery, Shilo, Manitoba, for user trials. After considerable use, it was discovered that the biggest problem was N/S antennas. When the instruments were being set up for use and the antenna was being installed or removed for dismantling, one and sometimes both rear deflector pins were being broken.

After several N/S antennas appeared, WO1 Jerry Thomas became concerned enough to ask Cpl Lee if he could devise a tool to eliminate the damage to the antenna. Cpl Lee, eager to accept the challenge put forth to himself and the Corps, went to work with pencil, scriber, shears and hammer to produce the required tool. He presented WO1 Thomas later with his tool, which proved to be ideal.

Directorate of Electronics Systems Engineering specialists evaluated and adopted this suggestion. The use of this simple tool almost entirely eliminates the possibility of damage to the dipoles both in assembling or removing, and in transit. The antenna is an expensive item valued at $125.

The benefits are intangible, moderate, with extensive application; 50 have been manufactured and the tool catalogued as Stock No. 5825-21-841-2096, Scale 9207. Although savings will accrue it is not possible to estimate their worth and therefore an award of $60.00 in accordance with the intangible scale was recommended.

WHERE'S WHO

By WO2 WE Davis

Our usual heading has been reversed for this edition because we are asking you to locate the names of the officers in the puzzle. Each name appears only once even though our Corps may have more than one Adams, MacLean or Walker. Rank also has been eliminated in listing the names in alphabetical order.

Instructions for working the puzzle are as follows:

(1) Circle each name as you find it. Each name is printed in a straight line in a direction which may be forward, backward, horizontal, vertical or diagonal.

(2) Overlapping of names such as CONNELL and NELLESTYN occurs but names such as HANN have not been included entirely within other names such as JOHANNES or KENNAH.

(3) The names RAY and ROY must be circled only horizontally in this puzzle.

(4) The 35 letters remaining uncircled, after you have completed the puzzle, when properly arranged will make up the heading shown at the top of the list of names.

Colonel VR Schjelderup presenting Cpl Lee with his cheque. Major DA Nicholson looks on.

COMMISSIONED OFFICERS OF THE RCEME CORPS

1. Adams
2. Allaire
3. Anderson
4. Armstrong
5. Atwood
6. Axford
7. Baird
8. Barrey
9. Bart
10. Bateson
11. Belisle
12. Bell
13. Bergeron
14. Betts
15. Betzner
16. Black
17. Bouchard
18. Boucher
19. Bouliane
20. Boughton
21. Bourassa
22. Boyko
23. Brent
24. Brewster
25. Britt
26. Brodie
27. Brown
28. Bruce
29. Burcombe
30. Burton
31. Bydal
32. Byer
33. Calvert
34. Campbell
35. Cantlon
36. Carlyle
37. Carrier
38. Carruthers
39. Cawsey
40. Chapman
41. Charlebois
42. Charles
43. Choquette
44. Churchill
45. Clarke
46. Clerke
47. Code
48. Cohen
49. Collins
50. Connell
51. Conway
52. Cooper
53. Cox
54. Crane
55. Creber
56. Crookston
57. Cuddihey
58. Cumming
59. Davies
60. Daviss
61. Deschenes
62. Diebert
63. Dinsmore
64. Doucet
65. Dupont
66. Edmond
67. Edworthy
68. Enright
69. Feller
70. Fendick
71. Ferguson
72. Fischer
73. Francis
74. Fraser
75. Fryer
76. Fuller
77. Fyfe
78. Garnett
79. Geary
80. Gilbert
81. Gillis
82. Girard
83. Girdler
84. Glover
85. Glynn
86. Godson
87. Goulding
88. Graham
89. Grainger
90. Graye
91. Green
92. Griffin
93. Groom
94. Hoggins
95. Hamilton
96. Hammond
97. Hampson
98. Hann
99. Hansen
100. Hanson
101. Hardy
102. Hare
103. Hartwick
104. Healey
105. Hellard
106. Hellemans
107. Hellyer
108. Henderson
109. Hill
110. Hinton
111. Hlohovsky
112. Hodgson
113. Holt
114. House
115. Howard
116. Hurst
117. Hutson
118. Ilott
119. Isbester
120. Jeffrey
121. Jobin
122. Johannes
123. Johnson
124. Johnston
125. Jones
126. Joslin
127. Joyner
128. Kane
129. Kaufman
130. Kaye
131. Kayne
132. Keays
133. Kennah
134. Kingsbury
135. Laird
136. Lamb
137. Langdon
138. Laviolette
139. Lawrence
140. Leach
141. Leblanc
142. Leflar
143. Legg
144. Lelacheur
145. Lewis
146. Libbey
147. Loven
148. Lowthian
149. Lucano
150. MacDonald
151. MacDonnell
152. MacGillivray
153. MacIntosh
154. MacKenzie
155. MacLean
156. MacLellan
157. MacLeod
158. Maguire
159. Maher
160. Maitland
161. Manning
162. Marchildon
163. Marriner
164. Martel
165. Mason
166. Masuda
167. Matthews
168. McCaughan
169. McCulloch
170. McDougall
171. McEachern
172. McKibbin
173. McKinlay
174. McLeod
175. Meek
176. Melvin
177. Mendelsohn
178. Mersereau
179. Millen
180. Miller
181. Morgan
182. Mowbray
183. Moyse
184. Nappert
185. Nellestyn
186. Nicholson
187. North
188. Norton
189. O'Connor
190. Oishi
191. O'Rourke
192. Ouimet
193. Owens
194. Pacquette
195. Panke
196. Patterson
197. Pedneault
198. Penny
199. Pergat
200. Perreault
201. Perrin
202. Perry
203. Peters
204. Pfeiffer
205. Pinder-Moss
206. Pirt
207. Podesto
208. Pospisil
209. Pothier
210. Potter
211. Provan
212. Purton
213. Racicot
214. Ray
215. Reid
216. Rhodes
217. Richards
218. Riley
219. Rivers
220. Roberts
221. Roche
222. Rochefort
223. Rose
224. Rosson
225. Roy
226. Ruscher
227. Sainsbury
228. Sanders
229. Savage
230. Scagnetti
231. Screaton
232. Seguin
233. Sergi
234. Shaw
235. Sheehan
236. Simms
237. Simpson
238. Sinden
239. Siwik
240. Smith
241. Sneddon
242. Snell
243. Sochasky
244. Spackman
245. Springford
246. St Aubin
247. Stevens
248. Stewart
249. Stott
250. Strang
251. Svab
252. Swallow
253. Tachereau
254. Taylor
255. Thomas
256. Thomsen
257. Thompson
258. Thorn
259. Tidy
260. Tomlinson
261. Touchet
262. Treleaven
263. Tuck
264. Tupper
265. Turcotte

266. Vollett
267. Walker
268. Ward
269. Weston
270. Whitehead
271. Williams
272. Willing
273. Wilson
274. Wood
275. Wright
276. Yarymowich

N O S N I L M O T N I C H O L S O N I B U A T S H M D R O F G N I R P S
O R U S C H E R H N O T R U B U R C O M B E L L A A D E S C H E N E S R
D U P O N T S O O W I L L I A M S E O R C L L E N N O D C A M F A O A E
L E S T L I S I P S O P T O U C H E T N T C A L N N O R T H C E M U I H
I H C S H L O H O V S K Y N M E N F N E N O A C E I Y T F E L R K I N T
H C A E E N O T H G U O B A A A O N R A P O N U K N H R R N E G C M S U
C A G D A I Y Y A R C O N E I C S M O Y H P R M G G N O A D O U A E B R
R L N O L V H O W A R D C L T H P A K S E E A E I H M O N E D S P T U R
A E E P E L T T O L I O U C L E M G C S P R E R I S A I C R G O S R R A
M L T W Y E R P F F D O A A A R O U I Y R M W H N D P N I S E N O J Y C
A O T T I M O E U E B R D M N N H I D I E E A I S R O Y S O E C U R B I
C W I A O S W N L L R A D E D C T R N E M S D H O D G S O N H E N A R C
L T R G G P D N L I M R V O S O A E E M R G W N I M A C K E N Z I E E O
E H B A R R E Y E S A O O I V H R E F Y F I N A A S N I F F I R G E W T
L I H E E E E R R W L W M S A E H R A I C S G O U L D I N G S T
L A O K T R E P P U T P M E B N T D M L E G R A I N G E R A T E
A N L B E T Z N E R S E K B J Y I L F C L T L H O S K O Y V E N
N A T A D U S A M O E R O O E A M E U N C A T M E R T E D A R R
W O L L A W S E N K A R B Y F K S R A D M U M O U L B R G S R A
I I S B E S T E R L O I S K F G H I K B R A L O C B L N E G O G
L C O N W A Y F C D N N F O R I A I N I H M R L I R O E R B R N
S E N N A H O J O W E N S N E L L I H D W I V D I O T L O R U A M O O A
O E P O T H I E R V C E N N Y L G R S I R E L L E H O F T C H T O A H R
N Y I C N A L B E L M B L T P I N H S E R O L A O N E S N A H M A P N T
N A M V K C U T S A R E R C I S C O Y S N E F M I E M M M N O T S E W S
O L P A A U S N S E G N G P R J M A S A N O A X D R A H C U O B S R N R
D N U M C D E O N G O N A R T O C C L R R S R M A C D O N A L D A R O E
G I R A R D N T L S I N C E L Y K Y H V E B L E R E H C S I F T R E S Y
N K T B D I O O T M K O E H U N I D A A E T W A G J O S L I N H U A R L
A C O O S H V U M E X A C A A E B I R W R R T O W R E L L I M O O U E L
L M N U E E H U G D U O N M E R B T T A H L T A M R E E S Y O M B L D E
C C O C R Y C B R A E Q P E N Y I R W S A I E T P A E B Y E R S S T N H
T H T H G I R N E U L A C J D O N E I Y R L T S O E C N I U G E S B A H
R U A E I O P R A R H L O A E A T B C A E U G E T T N G C N A N E H C C
E R E R W S E E E C E H L T P S V L K E Y C N H H T S O I E N L E A O I
L C R N L S R F R K N B R O D I E I I K A A I J O E E K T L I L E L E W
E H C O R E F E R S W E H T T A M G S M K N L O L U A L H S L L L P L O
A I S E H I B E T A B A T E S O N A P S A O L H E Q S D L A K I R P Y M
V L M C E E L O L E S N I G G A H B A R T H I N T O N E R O N O V E L Y
E L S F R C N E I L S E D O U C E T S R U H W S R H O D E S V N O R R R
N A P P E R T D Y S E O R R O L Y A T W O O D O A C S D R A H C I R A A
T E T T E L O I V A L R R S L N Y T S E L L E N M A C I N T O S H Y C Y

PHOSGENE FROM WELDING

The following article was contributed by the Maritime Safety Digest, which appeared in the Safety Review, a publication of the Office of Industrial Relations, Navy Department, Washington, D.C.

"We did not believe this ourselves, but it has happened twice. The Bureau of Medicine states that the intense ultraviolet rays from a welding arc could decompose nearby chlorinated solvent fumes into phosgene and other highly toxic gases. In both incidents, tests of the atmosphere, after reports of eye and respiratory irritations were received, showed phosgene concentrations from three to five times above the safe level. In one case, painters were cleaning equipment with methyl chloroform while arc welding was in progress nearby. In the other instance, dye-penetrant testing and arc welding were being done in the same compartment. The dye-penetrant contained a chlorinated solvent. Volatile, chlorinated hydrocarbons should not be used around arc welding. If practicable, non-chlorinated compounds should be substituted where such occurrences are unavoidable.

"Foamed plastic is another source of trouble when a person is working with foamed-in-place plastic without proper ventilation or respiratory protection. Eight such incidents have been reported recently. They occurred in such places as boat shops and ship compartments, including reefer places and boat-repair yards. One noteworthy incident was the experience of a flame cutter who was burning out a section of the rudder when his burner ignited a small amount of the foamed polyurethane plastic. Subsequently, he developed the typical asthmatic symptoms from the fumes.

"The offending ingredient of the plastic mixture is toluene di-iso cyanate (TDI), which acts as the foaming agent and as one of the hardening constituents. Because of its severe irritating effect on the eyes and upper respiratory tract, no one will stay, voluntarily, in a high concentration of DTI vapors. However, at vapor concentrations near its threshold limits value (TLV), the odor is almost undetectable."

"The following recommendations were made.

"Workers should be instructed on the hazards involved and on safe handling procedures.

"Local exhaust ventilation should be provided.

"Workers operating in confined spaces or where adequate exhaust ventilation cannot be furnished, should wear air-supplied respirators.

"Rubber gloves should be worn when handling or mixing the plastic.

"Respiratory protection should be provided and used in welding, cutting, or heating operations which are likely to come in contact with in-place foamed plastics."

Reprinted from the Monthly Bulletin, Department of Labour, Accident Prevention and Compensation Branch

RADIAC DOSIMETER FAILURES

A number of dosimeters are failing as 'leakers'. This is due to deformed bellows in the charging switch. This deformation is caused by the charging technique, and possibly the tension on the charging pedestal is too high. When a Maintenance Section identifies a Unit with 'dosimeter leaking' problems it will call in the Unit's dosimeter chargers for inspection. EME Manual Electrical G 104 is in draft and will detail a procedure for correcting bent bellows in the charging switch. This manual will be on distribution in July 1967.

(WORKSHOP RETREAT from page 25)

condolence and gratitude, for we could not function long without parts and steak.

Other retreats do exist for the workshop but on a platoon level in the form of an overnight village scheme. These retreats are a real snap with the only hardship being a lack of facilities and no place to dig them. The run on the local gasthof is dual purpose, and both lines are long. Regardless of the type of retreat the therapy is the same, and home or barracks never seemed so good upon return.

ARC WELDING FLASH

By Dr TF McCarthy
Clinical Consultant,
Occupational Health Division,
Department of National Health and Welfare

The very high temperatures used in welding operations produce along with visible light other forms of radiant energy. The ultraviolet and infrared rays that cannot be seen can cause damage to the unprotected eye.

Experienced welders seldom suffer from the painful eye inflammation that results from exposure of the unprotected eye to the welding flash. Most of them have suffered its effects during their training and not many care to repeat the experience. Onlookers and ill-informed fellow workers may not be so fortunate.

This common form of eye injury is caused by ultraviolet rays. When these rays strike the eye they cause inflammation and swelling of the covering of the eye in much the same manner as the skin is affected by exposure to sunlight. Blonde, fair-skinned people are said to be more susceptible to arc flash than those of dark complexion.

The symptoms of arc flash begin some hours after the incident, usually four to twelve. They consist of pain and discomfort, a marked dislike of looking at lights (photophobia), a feeling of sand in the eyes, watering of the eyes and perhaps an impression as of coloured rings around a light source.

Untreated, the symptoms subside in 2 or 3 days. The person suffering this affliction can be made more comfortable by cold compresses to the eye and instillation of a bland oil such as sterile castor oil. When a physican is in attendance he may choose to use a mild local anaesthetic to relieve the discomfort.

Because of the delay in the onset of symptoms the first treatment may have to be given at home. It may be difficult for the uninformed workman to relate his eye symptoms to work exposure. In the home situation simple treatment will be safest, and should be restricted to the application of cold water compresses and the avoidance of light.

In the working environment the first-aid station may have supplies of sterile medications for use in such cases.

Local anaesthetics should not be used without the specific order of a doctor. Any drops that are used in the eye should be sterile. Solutions that have been opened and in use are likely to contain germs.

In most cases of arc flash recovery will be complete in a few days even without treatment. If, however, infection should develop, the loss of vision and perhaps of the eye is a real possibility. Any case that does not respond promptly to simple first-aid measures should be referred to a physician.

Although welding is the common source of arc flash in industry it does occur in other situations. The arc from a short-circuiting high tension wire, nearby lightning flashes and arc lights are other sources.

Some of the names of this condition follow: photophthalimia, arc flash, arc eye, arc welders eye flash, welders kerato conjunctivitis, electric ophtalmia, flashed eyes.

Ideally arc flash should be prevented by adhering to well-known safety measures.

1. Eye protection for welders and fellow workmen (glasses, booths, etc.).
2. No unprotected person allowed within 200 feet of a welding operation.
3. Informed workmen; not only welders.

Briefing
An oral display of highly selected and polished words of wisdom designed to obfuscate the written truth.

History of a Unit – 39th. Tech Sqn RCEME

Early in 1942 London Military District No.1 announced the organization of a new reserve army unit in Windsor, the 2nd Divisional Workshop (RCOC), under the command of Capt EO Harvey. The unit's first parade was held April 27, 1942 at Jackson Armouries with a strength of four officers and twenty-two other ranks.

The new unit quickly grew in strength. In 1944 command was taken by Major BW MacKeen and the unit became No.1 Infantry Brigade Workshop RCEME. Early in 1945 it moved to a new location at the St Luke Road Barracks.

In 1947 the unit name was again changed to become 24 Medium Workshop RCEME and command changed again to Major DC Little and in 1950 the unit name became 32nd Technical Squadron RCEME.

A further change occurred in 1951 when the unit became 6 Technical Regiment and the establishment was increased to 700 all ranks. Lt Col DC O'Brien, MBE, former Commanding Officer of the Windsor Regiment (RCAC) took command of the new regiment. Lt Col Robert Gilmour, MBE, became the new Commanding Officer in 1953.

In 1955 the unit was reduced from a regiment to a squadron and became known as 39 Tech Squadron RCEME. Commanding officers from that date included Major Robert Perks, Major Arthur H Tupper, Major OJ Atkins through to the present commanding officer, Major JH McMahon who assumed command in January 1965.

As a result of the reorganization of the militia in the Fall of 1964 our unit was retained in this area but our establishment was curtailed. As mentioned above the present commanding officer took command in January 1965 and with our present effective strength of almost 90 per cent of establishment, it is felt that we have one of the most active units in the area.

The unit moved into their present quarters in the University Street Armouries in downtown Windsor in the spring of 1965.

The unit has compiled an enviable record in the area. One of the principle reasons being that the industries in the Windsor district employ a preponderance of tradesmen. In addition there are three secondary vocational schools from which we draw a good part of our young craftsmen.

We are the only RCEME Militia Unit this side of Hamilton and currently have a strong cadre of officers and senior NCOs. A close association has always been maintained with sister units in the US Armed Forces in the Detroit area. Currently we exchange annual visits with technical units located at Selfridge Air Force Base, Michigan.

Unit Personalities - 39th Tech Sqn RCEME

Major McMahon, CD, 44, is employed with the Chrysler Corporation of Canada in Windsor in the capacity of Manager, Data Processing Department. His regular force and militia service total 28 years including 6 years during the Second World War.

Major McMahon has been very active in Windsor community affairs and serves on a Board of Directors of a Windsor Group Therapy project, St Mary's Academy, and is vice chairman of the London Diocesean Council of Catholic Charities. He is currently serving the Windsor District Co-ordinator for the Armed Forces Centennial projects.

He is married and has seven children.

Capt RJ LaVigne, CD, 42, 2 IC since March 65 is Traffic Manager with Hiram Walker and Sons Limited, Walkerville. His 20 years service includes fifteen years regular and reserve with the RCAF plus 5 years militia service with the Windsor Regiment (RCAC) and 39 Tech Sqn RCEME.

He has been active in the traffic and transportation field in the Windsor-Detroit area having served in executive positions with the Windsor Transportation Club, the Canadian Industrial Traffic League, and the Detroit Traffic Club.

He is married and has one child.

PERSONNEL OF 39 TECHNICAL SQUADRON TAKING PART IN FIELD WORKSHOP DEFENCE SCHEME HELD ON TRAINING GROUNDS OUTSIDE OF WINDSOR.

The "Inch Arran"

By Major AJ Jeffery

RCEME colours may have been shown for the last time in an unusual recovery situation on Saturady, 26 Nov 66, at Kingston's Naval jetty - HMCS Cataraqui.

This particular operation might be considered as a comparison piece to the "Horse Recovery" which took place in Halifax some years ago and was the cartoon theme of an old RCEME Quarterly cover by Capt Len Norris in October 1950. See FLASHBACK, next page.

It appears that a group of ex-Navy types called the "Kingston Mariners' Association" purchased a retired frigate - the Inch Arran - from the Defence Department with the intention of docking it in Kingston and turning it into a youth centre and ex-Mariners' Club. But they ran into dockage and anchorage problems when the ship, without engines, arrived in Kingston's inner harbour. Judicious manoevering by an enterprising crew brought the frigate to rest at the RCN jetty where this hulk was anything but a welcome sight to current Naval types or the Commandant of RMC, the jetty being their door-step so to speak.

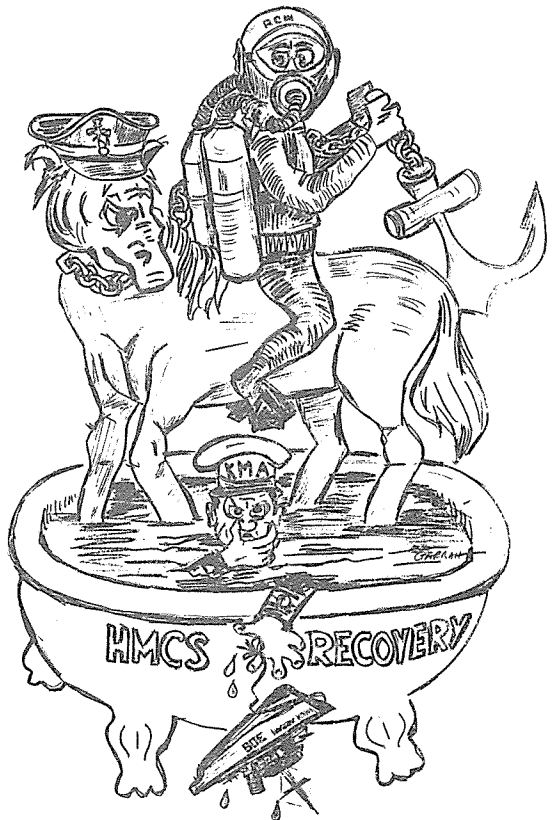
After a sojourn of about three weeks with many meetings and discussions, the Minister's office directed that the hulk "Inch Arran" was to be removed from its unauthorized berth alongside HMCS Cataraqui. Necessary Naval arrangements were made to move said hulk Saturday morning 26 Nov 66. These arrangements with crews from CFB Kingston Base Maintenance Section.

Stealing a march on the Navy, a boarding party on the preceding Friday night sawed through a link of the anchor chain and let the main anchor go, presumably to prevent the removal and anchoring of the hulk in another location. The Navy 'pressed on' Saturday morning, however, and had two divers locate and connect the hook of an M62 to the anchor.

To cut a long story short, the welding and cutting equipment on the M62 saved the day. The anchor chain was welded together and the hulk was moved back to its original position in the harbour and it is presumed the Kingston Mariners' Association are again looking for a 'safe' berth.

To quote a report by Lt Cmdr Lesslie, Staff Officer RCN at HMCS Cataraqui "I was pleased to note that, at all rank levels, this undertaking was carried out with enthusiasm and energy and with ample scope for joking. In the same view, may I suggest that the proponents of unification would have been pleased to note the good-natured banter continually exchanged between the Cataraqui cable party and the RCEME crews of the two recovery vehicles. Despite the frustrations of the situation, there was no evidence of inter-personal exaspiration."

The cartoon accompanying this article is an original by JJ Garrah, the Technical Officer of Base Maintenance Section CFB Kingston.



RCEME AT ANCHOR

THE RCEME QUARTERLY

The information and statements herein are not to be quoted as authority for action. The Quarterly is published to assist RCEME personnel in keeping abreast of current trends and developments and to circulate interesting news about the corps.

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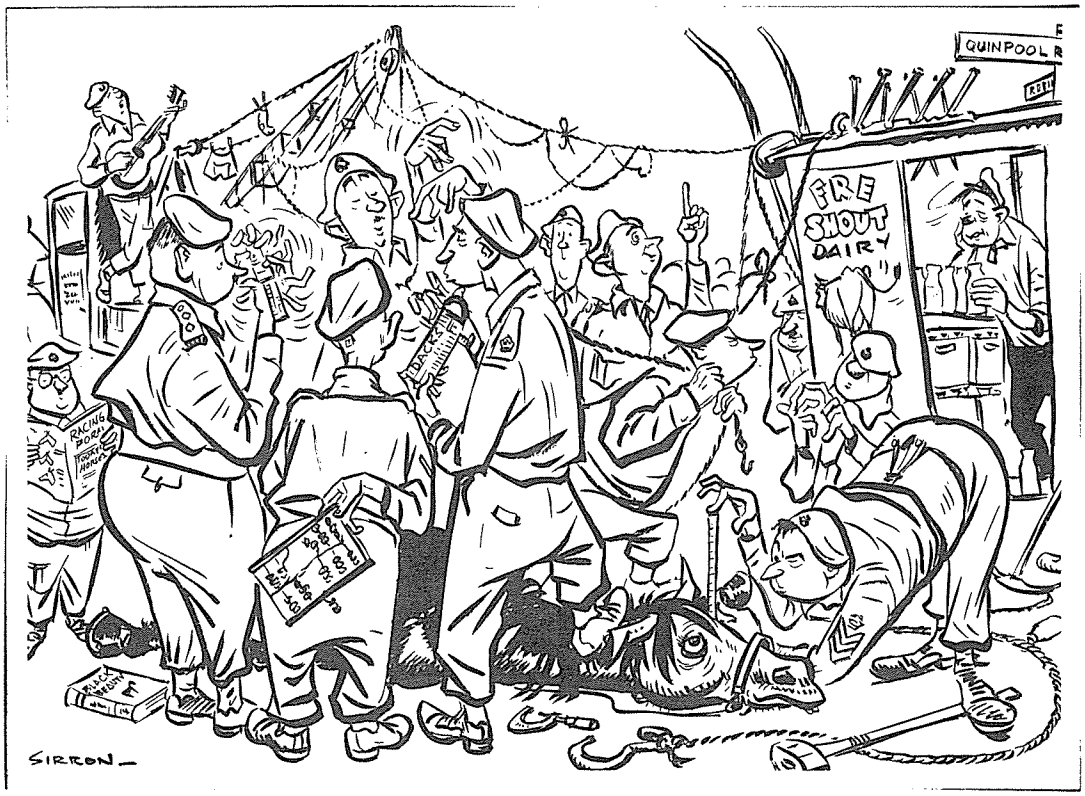


HORSE RECOVERY

"Two slide rules, (we quote) 22 yards of marquee-side tarpaulin, 1500 pounds of ailing horseflesh, 6 feet of h o a r s e profanity and a full squadron of well-scratched RCEME heads were mixed together, in Halifax, the other day to provide 200 Base Workshop with a recovery job, from which it will take them a long time to recover."

Have you got the picture? Well, here's the story.

"Plodding Josephine" had suddenly collapsed at the intersection of Quinpool Road and Robie Street, while pulling the early milk run.

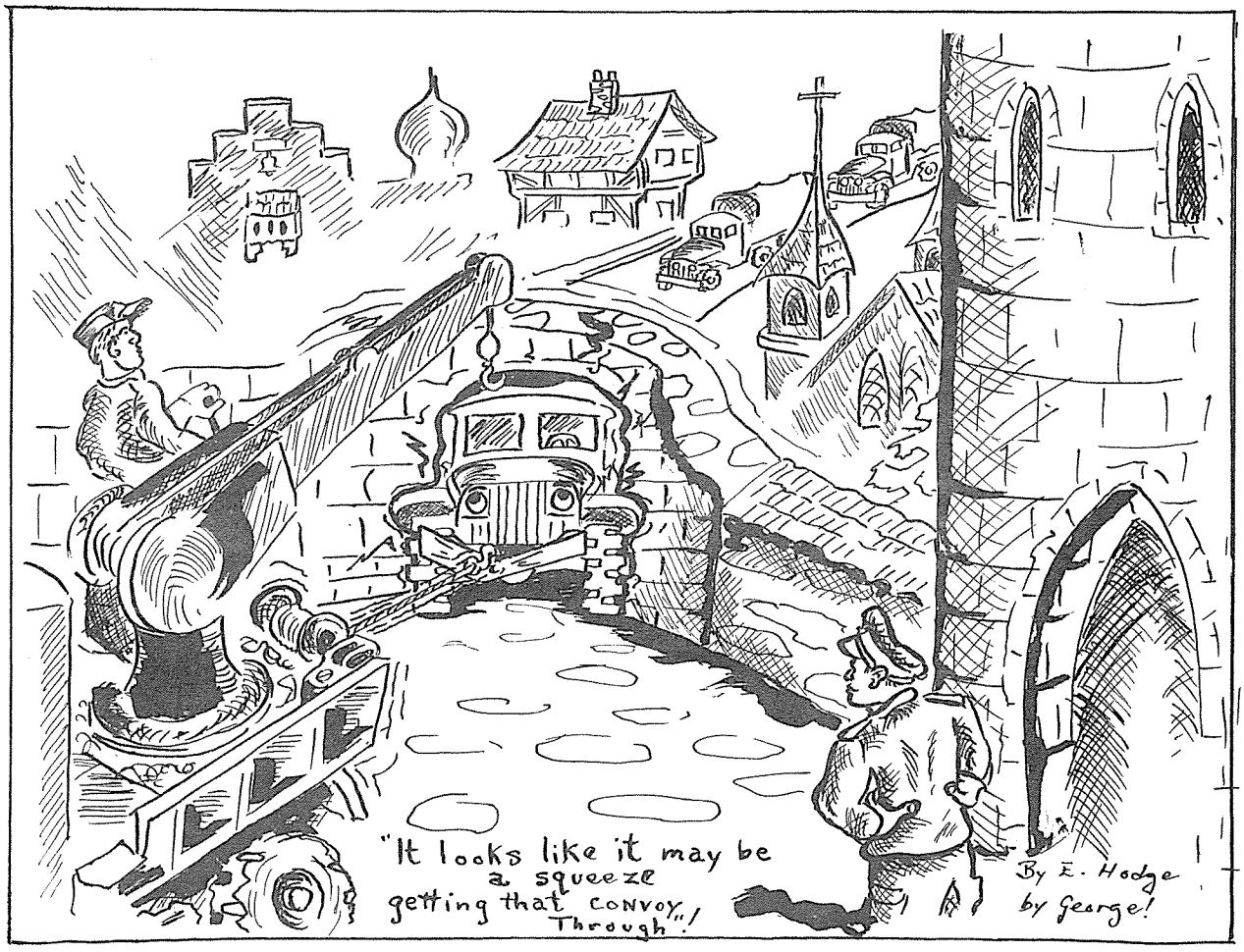
The local veterinary "exuding the tantalizing aroma of the stables" arrived on the scene and declared that if Jo was to survive she must be removed to his s t a b l e at once. After the fire department, garages and "One Long Wong's Laundry Delivery Service" had refused to remove her, RCEME was c a l l e d upon to make recovery.

So efficently w a s this j o b done (please study the picture) that Jo lived to plod again.

THIS MUST BE THE PLACE

You cats
Back home in Canada
Sitting around those static workshops
Or teaching at the RCEME School
Yeah!
You won't get posted to the field units
Or ever wear the Force Mobile Flash
And you don't even know what the Red Patch is
'Cause you all got
Categories
Or too many kids
Or a friend in DPCA
We feel for you guys
But we just can't reach you
'Cause you don't know what you're missing.
Over here at the Sharp End we've got
Cheap booze
Cigarettes
Frauleins and bratwurst
And lots of field time
All you guys have is money
And the odd night at the Legion.
Why don't you
Stop pretending you have a category
And marry off your kids
And come over here where the action is,
Germany!
Then we can all go home
For Expo
And steal your jobs
And live the soft life
While you guys work for a change.
Crazy!

Anonymous



FITTING THE ENGINE LUBE TO THE JOB

By A. R. Doepel,

Regional Lubrication Engineer,

Shell Oil Company

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ENGINE OILS
API SERVICE CLASSIFICATION

The following classification of motor oils, created by The American Petroleum Institute, provides an easy, reliable guide for selecting motor oils to use under widely varying operating conditions.

GASOLINE ENGINES

Service MS--Service typical of gasoline and other spark-ignition engines used under unfavorable or severe operating conditions and where there are special lubrication requirements for deposit, wear, or bearing corrosion control, due to operating conditions or to engine design or fuel characteristics.

Service MM--Service typical of gasoline and other spark-ignition engines used under moderate operating conditions, but presenting problems of deposit or bearing-corrosion control when crankcase oil temperatures are high.

Service ML--Service typical of gasoline and other spark-ignition engines used under light or favorable operating conditions, the engines having no special lubrication requirements and having no design characteristics sensitive to deposit formation.

DIESEL ENGINES

Service DS--Service typical of diesel engines operating under very severe conditions or having design characteristics for using fuel tending to produce excessive wear or deposits.

Service DM--Service typical of diesel engines operating under severe conditions or using fuels of a type normally tending to promote deposits and wear, but where there are design characteristics or operating conditions which may make the engine either less sensitive to fuel effects or more sensitive to residues from lubricating oil.

Service DG--Service typical of diesel engines in any operation where there are no service requirements for wear or deposit control due to fuel lubricating oil or to engine design characteristics.

Commercial vehicles have come a long way from the open cab, chain-drive, oil-splash fed, hard-rubber tired delivery trucks of the 20's. One vital contributing factor has been the fuels and engine lubricants available to design engineers and fleet operators.

Today's selection of fleet lubricants is almost unlimited--with something available for the exact demands of almost any conceivable operating or servicing requirements.

But this proliferation can lead to confusion, resulting in the choice of a product that does not give the proper performance level.

How do you go about choosing the right engine lubricant for the specific application?

There are five basic requirements which the lubricant must meet. If any one is missing, the oil cannot do the proper job:

It must carry heat away from highly loaded surfaces such as the piston ring belt area, camshafts and bearings. Heat generated in these areas in dissipated through the block, to the cooling system, and radiated out through the oil pan. The oil's dissipation of heat from highly loaded areas is an often unrecognized job.

It must act as a sealant. This is most important in the area of highest pressure differential--namely the ring belt area. The sealing ability of a lubricant increases with viscosity, but maximum allowable viscosity is determined by other engine requirements.

It must clean. Today's high-quality motor oils are designed to suspend blow-by gases and soot, carbon, water, and partially burned fuel contaminants, so they will be drained out with the oil. Some of the most common contaminants are: water, antifreeze, condensation, dust and/or soot, coolant leak, wear particles, lead salts from gasoline fuels, unburned fuel. If these are not suspended properly in the oil they will coagulate and form sludge.

The oil must also prevent the formation of gums and varnishes in the engine. This material is generally a product of oil oxidation and can cause piston ring sticking, hydraulic lifter sticking, and sluggish valve and rocker arm action.

It must protect parts from rust and corrosion. Contrary to common belief, a straight mineral oil provides very little rust protection--and can actually be corrosive, depending on the degree of refinement.

It must lubricate. It must have the ability to prevent metal-to-metal contact in bearings, and prevent scuffing or galling in other highly loaded areas. The viscosity of the oil is a critical factor in providing proper lubrication. What is viscosity? It is a measure of the resistance of a liquid to flow. SAE motor oil viscosity classifications are charted below.

SAE numbers 5W, 10W, and 20W meet certain viscosity requirements at $0^{\circ}F$. Use of these grades assures a certain degree of low temperature startability. The remaining viscosity grades, SAE 20, 30, 40 and 50, divide the oils into various grades at an elevated temperature of $210^{\circ}F$. The use of a specified SAE viscosity classification at $210^{\circ}F$ assures the fleet operator that the oil has sufficient viscosity to provide a protective oil film for critical engine parts, even at high loads and temperatures. Oils such as SAE 20W/20 or 10W/30 meet the viscosity requirements for given grades at the low temperatures as well as the high temperature.

It should be noted, however, that an SAE number does not give any assurance of quality. It is only a method of grouping oils according to viscosity.

Another method used to designate oils is the API classification. The API system is based on the service requirements of engines as determined by engine design and severity of operation. A description of the service conditions covering both gasoline and diesel engines is given on this page.

Again it should be noted that the API ser-

vice classification is not based on engine tests. It is the oil company's designation for the type of service under which a given oil will perform satisfactorily.

There are several factors to be considered in determining the type and grade of lubricant that best satisfies your needs in performing these five jobs: The type of engine, type of service, desirable oil-drain periods, and climate, terrain and routes. Obviously, the best oil for one engine is not necessarily the best for another.

Engines operated under severe stop-and-go conditions, accompanied by considerable idling, dump large amounts of contaminants into the oil. To satisfactorily suspend this burden the oil must contain a better than average dispersant package. Likewise, vehicles operated at high speeds or loads are generally exposed to higher than normal oil temperatures. High temperatures tend to oxidize the oil more rapidly, resulting in formation of lacquers or varnishes in critical engine areas. An oil of exceptional thermal stability is required to prevent the formation of these harmful deposits.

Oil-drain intervals can be a critical factor in selecting the quality level of oil. At extremely short drain intervals, a moderate quality oil of low dispersancy may provide satisfactory engine life. However--as time between drains is extended--the need for higher dispersancy oil is increased. Many operators use premium quality oils, coupled with increased drain intervals, to reduce maintenance labor expense.

The start-up temperature of an engine dictates the maximum allowable viscosity which can be satisfactorily used. In cold areas as SAE 30 oil is too viscous to provide adequate engine cranking speed for good startability. These low temperature conditions then require a single graded SAE 10W, 20W, or an SAE 10W/30, or 10W/40 multi-viscosity oil.

Some fleets have routes which frequently take them into cold or mountainous areas. If a vehicle is parked overnight in subzero temperatures hard starting is usually a problem; or even worse, oil starvation may occur when the engine does start.

Once you have chosen the lubricant you are going to use, several approaches are open to assist in making the final decision as to what drain interval is best for your fleet:

You may use your own experience with a given oil or quality level of oil in your own equipment. This knowledge will include the general life you have been receiving from engines, the cleanliness level of the engines at overhaul or repair, and the conditions of oil filters at time of change.

The best approach is to enlist the assistance of your oil supplier's lubrication engineer. He is in a position to suggest or recommend a practical oil-drain period for vehicles based on experience with the same type oil in the same make engines operating under similar conditions. The supplier may also determine oil condition with laboratory analysis on samples representative of your operation.

Or you may desire to use an independent oil analysis laboratory. Some fleets take routine samples from all of their engines and change the oil only on the advice of the laboratory. Analyses vary greatly in cost, based on the extent of the analysis and the size of your fleet. They can be of real assistance to the fleet manager--but remember that you may be on the road to false economy if the cost of the analysis approaches the cost of an oil change.

The engine manufacturer can also serve as a guide to drain intervals. Manufacturers claim their recommendations are based on average service. Their warranty on today's gasoline or diesel engine has become an important factor in its purchase and maintenance. Most operators have found it doesn't pay to deviate very far from the manufacturer's recommendation. If they do this, the chances are they may end up with a voided warranty.

Manufacturers designate the type oils they recommend by SAE classifications, API designations, and actual laboratory tests.

Engine wear can be divided into three categories:

Scuffing, which occurs when there's metal-to-metal contact between two moving and heavily loaded surfaces. Improper design, post surface condition, or insufficient load-carrying ability of the lubricant can result in scuffing

wear. It may occur in areas such as cam lobes and followers, rocker arm shafts, oil pump gears, piston rings, and liners. Scuffing wear can be reduced by using oils of the proper SAE viscosity grade and quality level.

Abrasive wear is caused by the interjection of solid contaminants such as dust or wear particles between two mating surfaces. Excessive dirt or dust finds its way into the oil through air cleaners, joints, and hose connections.

Corrosive wear is initiated by chemical attack. This includes the resultant scuffing and abrasive wear.

Engine deposits, in the form of sludge and lacquer, can also significantly reduce the life expectancy of an engine.

There are also several mechanical causes related to engine maintenance which play a major role in promoting deposits:

Poor crankcase ventilation. A properly operating crankcase ventilation system removes harmful blow-by gases from the crankcase before they condense and become solubilized in the engine oil. Malfunctioning here leads to heavy contamination of the oil, and additive depletion that cause excessive sludge and lacquer formation.

Worn, stuck or broken piston rings, which let excessive blow-by gases enter the crankcase.

Poor combustion is another condition which dumps excessive contaminants into the crankcase. Poor combustion may be caused by air cleaners which have insufficient capacity, or which have become plugged because of dirt or other airborne contaminants. Other factors contributing to poor combustion are over-rich air/fuel ratios on gasoline engines, or worn and dribbling injectors on diesel engines.

Low oil temperatures. Proper oil operating temperatures are necessary to volatilize oil contaminants such as water and fuel. Oil operating temperatures of around 170° to 200°F are generally considered ideal. Oil temperatures may be controlled by means of an oil/water or oil/air heat exchanger, and by controlling the engine coolant temperature. Many engine sludging problems have been solved merely by increasing the engine coolant temperature 20°F.

Coolant leakage, ethylene glycol (antifreeze) or water from leaking head gaskets or liner O-rings are contaminants that can readily promote engine sludging. Sufficient quantities of permanent type antifreeze leaking into the oil can cause complete engine seizure. Very small quantities can result in a severely sludged engine. Contamination by water alone is undesirable, but results are not as dramatic or expensive as antifreeze contamination.

The success of any PM program undeniably depends a great deal on the emphasis given to lubrication and equipment maintenance records. Without these records indicating dates and hours or miles, even the best lubricants and best intentions are seriously handicapped.

SAE MOTOR OIL
VISCOSITY GRADES CLASSIFICATION

Crank Case Oils

SAE Number	Saybolt Seconds Viscosity Range 0°F Min.	0°F Max.	210°F Min.	210°F Max.
5-W	....	4000	...	...
10-W	a) 6000	12000	...	...
20-W	b) 12000	48000	...	...
20	....	.....	45	58
30	....	.....	58	70
40	....	.....	70	85
50	....	.....	85	110

a) The minimum viscosity of SAE 10W at 0°F can be waived provided the viscosity at 210°F is not below 40 Saybolt Universal Seconds Viscosity.

b) The minimum viscosity of SAE 20W at 0°F can be waived provided the viscosity at 210°F is not below 45 Saybolt Universal Seconds Viscosity.

who's where

LOCATION OF RCEME STAFF SERGEANTS

Alexander	RJ	EBS Bn	Brooks	JH	CFB Rivers
Allen	GH	14 Coy	Brooks	WE	HQ 11 Coy
Allen	T	2 Fd Sqn RCE	Burgess	DR	RCEME School
Allen	WH	2 Fd Wksp	Burleigh	JRM	1 Cdn Sig Regt
Anderson	DE	1 Fd Wksp	Burnet	RL	RCAC School
Anderson	GA	RCEME School	Campbell	HE	8 Coy
Anglin	P	7 Coy	Campbell	MA	HQ CBUE
Annas	OE	CJATC	Cannon	NB	4 Fd Wksp
Anyan	SG	2 Coy RCEME	Carey	JJ	2 Coy
Armour	GD	HQ CBUE	Caderberg	RA	RCEME School
Arnott	DA	10 Coy RCEME	Champagne	JP	5 Coy
Arsenault	JMC	CFB Valcartier	Chandler	RL	2 Fd Wksp
Arsenault	RP	2 Fd Wksp	Charbonneau	JJL	202 Wksp Depot
Atkin	RJ	CJATC	Clarey	DJ	RCEME School
Atkinson	HJ	CJATC	Clark	KD	3 RCHA
Aubuchon	R	HQ CBUE	Clark	WJ	HQ Mobile Comd
Bailey	L	202 Wksp Depot	Clarke	TJ	1 RCR
Baillargeon	H	5 Coy RCEME	Cleveland	AL	13 Coy
Baker	LG	215 Wksp (13 Coy)	Cleveland	HW	3 Coy
Bakewell	BW	215 Wksp (13 Coy)	Cochrane	GG	202 Wksp Depot
Barber	TW	4 RCHA	Cole	GN	8 Coy
Barker	AC	EBS Bn	Cole	JC	UNEF ME
Barron	AG	ME	Collins	EA	RCEME School
Batty	DJ	6 Coy	Conrad	LW	RCEME School
Beatty	MV	215 Wksp (13 Coy)	Conway	VG	4 Fd Wksp
Bell	WJ	RCEME School	Cooper	KRH	2 Fd Wksp
Bennett	BW	27 COD	Cote	L	5 Coy
Benoit	JAR	1 Tpt Hel Pl	Cough	JE	RCEME School
Berdan	WE	Alta Dist	Coutu	JRY	RCEME School
Bernard	JA	HQ CBUE	Cox	DL	14 Coy
Bernard	PA	202 Wksp Depot	Crack	HE	RCEME School
Berry	GH	1 Tpt Coy	Crane	JA	EASE
Best	WA	WSML *	Crawford	GML	5 Coy
Beveridge	AJ	DGOS	Creamer	JP	RCEME School
Bezanson	RT	7 Coy	Crews	L	7 Coy
Billinghurst	EJ	WSML	Cronin	RN	207 Wksp
Bing	J	1 RCHA	Crosby	RD	1 Tpt Coy
Birdsell	DG	4 Fd Wksp	Culling	JT	4 Fd Wksp
Bishop	JA	EBS Bn	Cushing	JE	27 COD
Blank	EW	HQ Materiel Comd	Danahy	RF	202 Wksp Depot
Bodine	WC	11 Coy	Davidson	DA	CADEE
Borden	FI	CJATC	Davidson	JH	RCEME School
Boudreau	M	Que Staff Log Adm	Davis	JJ	7 Coy
Boyce	EF	207 Wksp (3 Coy)	Daye	RE	1 Tpt Hel Pl
Boyd	KR	RCEME School	Desjardins	JGR	202 Wksp Depot
Brierley	HJ	1 Tpt Coy	Dewson	JE	4 Fd Wksp
Brimmage	RC	LETE	Dingwall	JD	10 Coy
Brooks	GE	RCEME School	Dobson	KF	4 Fd Wksp
Brooks	GJ	7 Coy	Doerksen	A	2 Coy

*Weapon Systems Management Land - formerly DEME

Dormer	GH	202 Wksp Depot
Dow	CL	RCEME School
Downes	JD	HQ Mobile Comd
Driscoll	LE	14 Coy
Drouin	JR	1 Coy
Ducasse	C	5 Coy
Duffy	RL	1 Fd Wksp
Dunham	RD	4 Fd Wksp
Dypolt	EJ	DID
Edwards	GH	LdSH
Eldridge	HE	7 Coy
Embury	RE	1 Fd Wksp
Encarnasion	RH	1 Fd Wksp
Endall	RE	1 RCHA
Ewing	GR	WSML
Fagan	WH	E Ont Area
Faulkner	EM	RCD
Finsten	LR	Sask Area
Fletcher	VA	2 Fd Wksp
Forbes	GH	10 Coy
Forbes	WR	1 RHC
Foreman	M	202 Wksp Depot
Freeman	JI	2 Coy
Frenette	N	3 RCHA
Funk	P	RCEME School
Gagnon	G	1 R22R
Gattrell	CA	4 Fd Wksp
Gaudet	NE	3 RCHA
Gayton	WM	RCEME School
Gibson	GW	2 Coy
Gibson	RR	RCEME School
Gillies	DJ	4 Coy
Glover	W	RCEME School
Goatcher	JA	212 Wksp (10 Coy)
Goodfellow	JJA	202 Wksp Depot
Goodman	EET	WSML
Gork	KD	212 Wksp
Gourlay	KJ	4 Fd Wksp
Green	ER	1 Fd Wksp
Gross	EJ	CFB Rockcliffe
Guard	AF	202 Wksp Depot
Guilbault	L	RCEME School
Guillemette	A	2 SSM Bty
Gumbley	HG	FGH
Hall	DA	RCEME School
Hancox	WR	RCD
Hanson	SG	202 Wksp Depot
Harding	WE	RCEME School
Harlow	AL	RCD
Harris	FJ	13 Coy
Hawkins	AE	UNEF ME
Hayes	CJ	202 Wksp Depot
Heichert	RR	8 CH
Hein	GR	RCEME School
Hemley	HWE	4 Fd Wksp
Henderson	WR	7 Coy
Hercun	WJ	4 Fd Sqn
Hetherington	LG	RCEME School
Hewitt	JS	13 Coy
Hicks	IH	EBS Bn
Hightower	WH	LdSH
Hill	FW	RCEME School
Holder	AE	27 COD
Hoskin	VE	11 Coy
Hudson	PA	CJATC
Hudson	TF	10 Coy
Humphries	GD	13 Coy
Hunt	AK	2 Coy
Ingram	S	214 Wksp
Irvine	HN	224 Wksp
Jackson	RWE	C Ont 'I' Staff
Jahraus	H	1 Fd Wksp
Jodoin	DJC	6 Coy
Juneau	MJ	1 RCHA
Kennett	AE	1 CBOU NWE
Kerr	RG	RCEME School
Kilfoyle	WC	3 Coy
King	RE	RCEME School
King	WG	UNEF ME
Kittle	GB	1 RCHA
Knight	DF	RCEME School
Knott	WH	ASE - RCE
Koethe	PJ	1 Fd Wksp
Kohler	WJ	3 Coy
Korzymowski	W	2 RCR
Kroecker	IJ	EBS Bn
Lacelle	JAD	E Que Area
Laing	JT	RCEME School
Lambert	HJ	CFB Valcartier
Lampron	R	202 Wksp Depot
Laramie	DA	2 R22eR
Lascelles	JA	HQ Mat Comd
Latour	RM	EBS Bn
Lawless	RG	FGH
Leblanc	RJ	25 COD
Ledgerwood	WA	C Ont Area
Lemieux	RJ	10 Coy
Leslie	WG	1 Fd Wksp
Linge	HL	1 Fd Wksp
Lloyd	RA	RCEME School
Lockett	AE	1 Fd Wksp
Lovell	AH	LdSH
Lowe	AF	RCEME School
MacDonald	JA	RCEME School
MacDonald	DWF	CJATC
MacDonald	WJ	1 Loc Bty
MacEwen	WR	RCEME School
MacKay	AH	2 Coy
MacKey	RW	3 RCHA
MacNeill	ER	7 Coy

MacNeill	WC	2 RCHA
Malmsten	RE	CFB Esquimalt
Mansell	GA	202 Wksp Depot
Mathews	DR	4 Fd Sqn
Martin	GH	13 Coy
Martineau	RVJ	HQ Que Comd
Mason	LR	RCEME School
Massey	JL	1 Coy
Masson	PH	DGOS
McAlpine	AJ	4 Fd Wksp
McClafferty	CE	4 Fd Wksp
McClafferty	LM	RCEME School
McDonald	JK	RCEME School
McDougall	RM	RCD
McDowell	FJ	4 Fd Wksp
McIntosh	RC	14 Coy
McKnight	CWB	10 Coy
McLaughlin	RJJ	CFB Rivers
McLean	GD	2 Coy
McLeod	AS	13 Coy
McPhail	H	4 Coy
McPhee	LW	2 Fd Wksp
Meharey	RME	RCEME School
Meints	RC	3 Fd Sqn RCE
Meisner	GG	RCAC School
Mercer	RL	7 Coy
Meroni	M	202 Wksp Depot
Middleton	RL	CJATC
Miller	AR	2 Fd Wksp
Miller	WPG	11 Coy
Mills	WT	DGOS
Mombourquette	JS	6 Coy
Mooney	CJO	1 Tpt Hel Pl
Moore	J	1 RCHA
Morden	SD	WSML
Moreau	G	W Que I Staff
Moreau	JJR	2 Fd Wksp
Munday	KR	CJATC
Murphy	JD	CFHQ/AU
Murphy	JW	1 Tpt Hel Pl
Murphy	WE	EBS Bn
Myra	EA	13 Coy
Nelles	BA	13 Coy
Nadon	LP	210 Wksp
Nichols	C	1 PPCLI
Nicol	RJ	2 Fd Wksp
Noel	H	WSML
Nolan	AR	1 Fd Wksp
Noonward	DC	202 Wksp Depot
Nunn	GCC	3 Coy
O'Nickle	KE	229 Wksp
O'Neill	JP	3 Coy
Orr	PL	LdSH
Owen	RS	2 Fd Wksp
Parkin	CR	RCEME School
Parsons	FG	DGOS
Patrick	KG	RCEME School
Patterson	A	FGH
Patterson	FA	2 Fd Wksp
Perrier	LO	UNEF ME
Phillips	GL	2 Fd Wksp
Phipps	LW	14 Coy
Pilote	GCR	214 Wksp
Pineault	E	CADEE
Piper	MW	27 COD
Poole	GPL	CJATC
Porteous	PR	1 SSM Bty
Porter	DFC	2 Fd Wksp
Porter	E	CADEE
Powell	ES	27 COD
Preston	WJ	4 Fd Wksp
Rector	UR	HQ CBUE
Regimbal	H	CFHQ
Reid	HC	4 Coy
Reid	JA	1 Fd Wksp
Rice	EA	EBS Bn
Ridlington	AR	5 Coy
Ripley	FA	1 CMED
Rivers	MA	EBS Bn
Robertson	JB	LdSH
Robinson	RN	HQ CBUE
Rogers	CP	6 Coy
Ross	RC	DGOS
Ross	WC	8 Coy
Rostek	WF	1 Loc Bty
Rowell	LH	3 Coy
Roy	AJ	27 COD
Sales	RS	2 Tpt Coy
Saunders	RB	RCEME School
Saunders	WJ	224 Wksp
Schell	SE	4 Fd Wksp
Schnars	AE	210 Wksp
Scott	JM	202 Wksp Depot
Serle	JD	1 Loc Bty
Shepherd	KI	RCEME School
Shultz	AD	3 Coy
Sibley	MH	229 Wksp
Siefert	JH	1 RCHA
Simpson	FA	2 Fd Wksp
Sitter	MC	215 Wksp
Skitteral	WE	1 Tpt Hel Pl
Slade	GL	6 Coy
Slaughter	AR	RCEME School
Smith	BW	202 Wksp Depot
Smith	DB	14 Coy
Smith	JA	UNEF ME
Smith	JW	2 PPCLI
Smith	RD	CFB Toronto
Snider	PL	DGOS
Snyder	WO	1 QOR of C

Squires	GR	RCEME School
Stables	JJ	RCEME School
Steele	PA	FGH
Steward	DF	2 Fd Wksp
Stewart	JR	HQ CBUE
Stoney	ME	FGH
Stooke	RG	1 SSM Bty
Stover	RE	RCEME School
Stubbe	W	212 Wksp
Sturley	KM	CJATC
Sudds	WA	202 Wksp Depot
Sugrue	M	DEM
Sutherland	RH	UNEF ME
Svendsen	AE	LdSH
Swann	EL	RCD
Swedberg	GO	UNEF ME
Swift	DW	7 Coy
Taylor	PH	DGOS
Tellenback	RE	4 Fd Wksp
Tetlock	IS	4 Fd Wksp
Thibault	CE	RCEME School
Thomson	NE	2 RCHA
Thorne	KA	CBUE
Toth	A	RCEME School
Townson	CB	UNEF ME
Tripple	RR	212 Wksp
Tryon	ER	RCEME School
Turcotte	GJ	RCEME School
Vipond	CD	CADEE
Wacey	WC	213 Wksp
Walker	LH	224 Wksp
Wardle	JS	1 Fd Wksp
Watson	DS	4 Fd Wksp
Watson	MTG	CFB Rockcliffe
Watson	RK	213 Wksp
Watts	JK	202 Wksp Depot
Waugh	CH	4 Fd Wksp
Weekes	WL	UNEF ME
Westergard	O	2 QOR of C
Wheatley	HJ	10 Coy
White	DR	CFHQ
White	JHR	RCEME School
White	TD	2 Coy
Whiteford	LG	RCEME School
Wilkes	RA	213 Wksp
Willard	RE	14 Coy
Williams	DB	7 Coy
Williams	W	2 Coy
Willis	RR	1 Fd Wksp
Wilson	FL	DPCA (RCEME)
Wiltshire	CAJ	HQ CBUE NWE
Winegarden	GW	RCEME School
Woolaver	EB	EASE
Woodard	GA	2 RCHA
Woodcock	FN	3 Coy
Yard	NS	4 Coy
Yarker	KAF	RCEME School
Young	RM	229 W (13 Coy)
Zdancewicz	EF	RCEME School

ST. HUBERT HOST TO EXPO VISITORS

Servicemen of the Canadian Forces and their families will have their own camping grounds close to the EXPO site this year thanks to the efforts of their fellow servicemen at Canadian Forces Base St. Hubert. Situated at the entrance to the base, at the junction of highways 1 and 9, the campsite is only four miles from the centre of EXPO.

The daily rental for a lot without electricity is $1.50 and $2.50 for one with electricity. Among the services offered at the campsite itself are a grocery store, a snack bar, a laundromat and washroom facilities including hot and cold running water. Additional services will include special transportation to EXPO and a sales office for EXPO passports and bonus books. Visiting servicemen and their families will also have access to regular base services such as theatre, gymnasium, auto club and messes, as guests of CFB St. Hubert. Limited baby-sitter service, picnic tables, ice, and propane gas will also be available.

"The Hub" campsite facilities are available to: serving members of the Canadian Forces; Department of National Defence employees; and retired members of the Canadian Forces. Those wishing to reserve a space at the campsite or to purchase EXPO passports and bonus books are advised to write immediately to:

Campsite Manager
CFB St. Hubert
St. Hubert, Quebec

[As of 25 Apr 67 sites were still reported available except during July and August - Editor]